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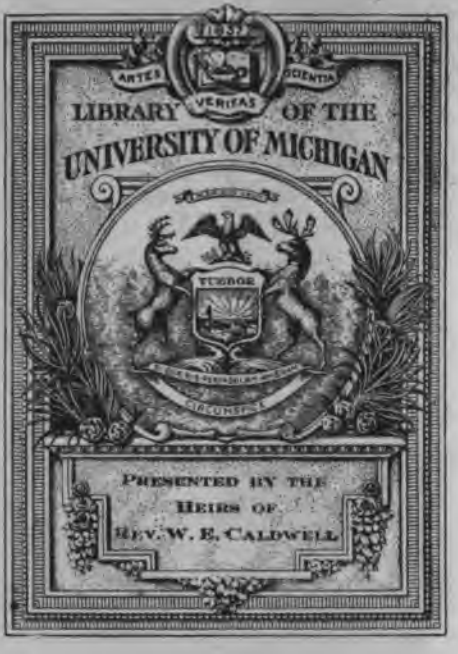
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OF

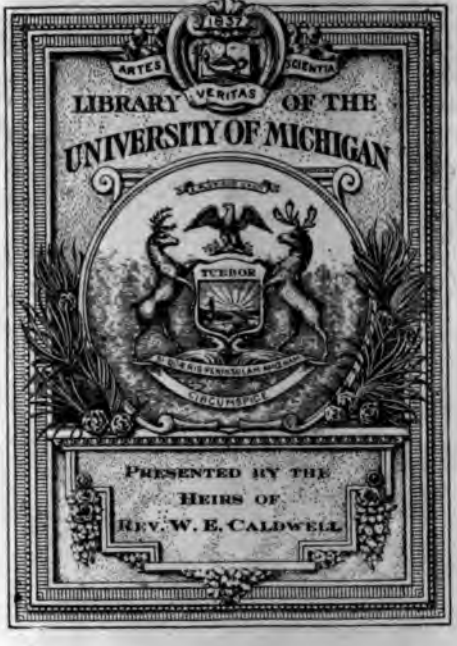
THE DUKE OF ARGYLL,

George Douglas Campbell, 8th Duke of, 1823-1900.

CONTAINING

"THE REIGN OF LAW," "THE UNITY OF NATURE," AND
"PRIMEVAL MAN."

NEW YORK:
JOHN B. ALDEN, PUBLISHER.
1884.



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Master of the Queen's Househ
land, Hereditary Sheriff of
and Chancellor of the Unive
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Let knowledge grow from more to n
But more of reverence in us dw
That mind and soul, according
May make one music as before,

But vaster. . . . . .

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NEW YORK:
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PREFACE TO THE FIFTH EDITION.

In preparing a Fifth Edition of this work, I have to acknowledge the favor—far greater than I expected—with which it has been received. The argument which it maintains is at variance with the philosophy of some of the most active and popular thinkers of the time; and on a few important points it deviates from the view commonly adopted by men with whom I am more generally agreed. Some adverse comment was therefore not only to be expected but desired. Most sincerely do I thank those who, in numerous Journals and Reviews, have undertaken this duty, for the uniformly courteous and even kindly spirit in which their criticisms have been expressed.

In this Edition no alteration has been made involving any change of principle or opinion. Here and there words have been added or removed according as individual passages appear to have been misunderstood. Throughout some of the chapters substantial additions have been made in reply, direct or indirect, to my principal opponents, whilst discussions, more detailed than were suitable for the text, have been committed to Notes at the end of the volume.

These additions and Notes have reference chiefly to the following articles which appeared in review of the "Reign of Law:"—

1st. An Article, by Mr. Alfred R. Wallace, in the *Quarterly Journal of Science*, for October, 1867. This article is in defence and illustration of Mr. Darwin's "Theory on the Origin of Species." The eminence of Mr. Wallace as a Naturalist, the extent of his researches in some of the most remarkable Faunas of the world, and the fact that, before the publication of Mr. Darwin's book, he had come to kindred, if not identical conclusions,—all render him peculiarly competent to defend the "The-

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ory," and to present it in the strongest light. I have therefore added to the text several passages suggested by the challenge he makes, and by the reasoning he employs. A further discussion of his paper will be found in Note A.

2d. An Article, by Mr. George H. Lewes, in the *Fortnightly Review*, for July, 1867, dealing with the main argument and conclusion of this work from the well-known point of view of the "Positive Philosophy." Wherever in the text there seemed a fitting place for doing so, I have inserted passages which deal with the reasoning of his paper, or with the same reasoning as it appears in a more systematic form in the Prolegomena to Mr. Lewes's "History of Philosophy."

3d. An Article in the *Dublin Review*, for April, 1867, which I am permitted to attribute to the learned editor of that periodical, Dr. Ward. The more special object of his adverse comment is the view I have taken of the doctrine of Free Will—a doctrine which Dr. Ward, with some warmth, accuses me of having virtually abandoned whilst professing to defend it. A slight alteration in the text may perhaps help to remove some objections, which rest entirely upon a misunderstanding of the sense in which particular words are used. But behind and beyond any misunderstanding of this kind, there lies apparently a substantial difference in respect to which my view remains unaltered. This difference will be found discussed in Note F, at the end of the volume.

4th. An Article in the *Contemporary Review*, for May, 1867, by Mr. J. P. Mahaffy. With reference to his observations, as well as to those of some other critics, I have somewhat expanded several passages which deal with the Supernatural, and with the various relations in which miracles have been conceived to stand towards the "Reign of Law." I have also, in a special Note (G), replied to a criticism in this paper, referring to the subject of Necessity and Free Will.

Other Notes have been added in illustration or support of various passages in the text.

As regards the intention I had at one time entertained of adding a chapter on "Law in Christian Theology," further reflection has only confirmed me in the feeling that this is a subject which cannot be adequately dealt with in such a form. I

can only again ask my readers to remember that although some ideas which belong to this subject, or touch it at various points, cannot be, and have not been, avoided, yet the desire and intention to postpone it, in so far as it was possible to do so has left blanks which every careful eye must see.

PREFACE TO THE FIRST EDITION.

SOME portions of this work have already appeared at various times in the *Edinburgh Review* in *Good Words* and in Addresses to the Royal Society of Edinburgh during the years in which I had the honor of being President of that Body. The deep interest of the matter dealt with in those Papers has induced me to expand them, to add new chapters on other aspects of the same subject, and to publish the whole in a connected form.

Among many other deficiencies which may be observed in this Volume, there is one which demands explanation, lest a serious misunderstanding should arise. I had intended to conclude with a chapter on "Law in Christian Theology." It was natural to reserve for that chapter all direct reference to some of the most fundamental facts of Human nature. Yet without such reference the Reign of Law, especially in the "Realm of Mind," cannot even be approached in some of its very highest and most important aspects. For the present, however, I have shrunk from entering upon questions so profound, of such critical import, and so inseparably connected with religious controversy. In the absence of any attempt to deal with this great branch of the inquiry, as well as in many other ways, I am painfully conscious of the narrow range of this work. I can only offer it as a very small contribution to the discussion of a boundless subject.

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THE REIGN OF LAW.

CHAPTER I.

THE SUPERNATURAL.

THE Supernatural—what is it? What do we mean by it? How do we define it? M. Guizot * tells us that belief in it is the special difficulty of our time—that denial of it is the form taken by all modern assaults on Christian faith; and again, that acceptance of it lies at the root, not only of Christianity, but of all positive religion whatever. These questions, then, concerning the Supernatural, are questions of first importance. Yet we find them seldom distinctly put, and still more seldom distinctly answered. This is a capital error in dealing with any question of philosophy. Half the perplexities of men are traceable to obscurity of thought hiding and breeding under obscurity of language. "The Supernatural" is a term employed often in different, and sometimes in contradictory, senses. It is difficult to make out whether M. Guizot himself means to identify belief in the Supernatural with belief in the existence of a God, or with belief in a particular mode of Divine action. But these are ideas quite separable and distinct. There may be some men who disbelieve in the Supernatural only because they are absolute atheists; but it is certain that there are others who have great difficulty in believing in the Supernatural, who are not atheists. What they doubt or deny is, not that God exists, but that He ever acts, or perhaps can act, unless in and through what they call the "Laws of Nature." M. Guizot, indeed, tells us that "God is the Supernatural in a

* "L'Eglise et la Société Chretienne en 1861," ch. iv. p. 19.

Person." But this is a rhetorical figure rather than a definition. He may, indeed, contend that it is inconsistent to believe in a God, and yet to disbelieve in the Supernatural; but he must admit, and indeed does admit, that such inconsistency is found in fact.

Theological and philosophical writers frequently use the Supernatural as synonymous with the Superhuman. But of course this is not the sense in which any one can have any difficulty in believing in it. The powers and works of Nature are all superhuman—more than Man can account for in their origin—more than he can resist in their energy—more than he can understand in their effects. This, then, cannot be the sense in which so many minds find it hard to accept the Supernatural; nor can it be the sense in which others cling to it as of the very essence of their religious faith. What, then, is that other sense in which the difficulty arises? Perhaps we shall best find it by seeking the idea which is competing with it, and by which it has been displaced. It is the Natural which has been casting out the Supernatural—the idea of Natural Law,—the universal reign of a fixed Order of things. This idea is a product of that immense development of the physical sciences which is characteristic of our time. We cannot read a periodical, or go into a lecture-room, without hearing it expressed. Sometimes, but rarely, it is stated with accuracy, and with due recognition of the limits within which Law can be said to comprehend the phenomena of the world. But generally it is expressed in language vague and hollow, covering inaccurate conceptions, and confounding under common forms of expression ideas which are essentially distinct. The mere ticketing and orderly assortment of external facts is constantly spoken of as if it were in the nature of Explanation, and as if no higher truth in respect to natural phenomena were to be attained or desired.* And herein we see both the result for which Bacon labored, and the danger against which Bacon prayed. It has

* Those who have followed the course of recent speculation will recognize this sentence as intended to describe the characteristic principle of the Positive Philosophy. I am glad to observe that so competent a judge as Mr. George H. Lewes says of it:—"Although not, perhaps, the most dignified or explicit statement of the Positive point of view, this may be accepted as essentially correct."—*Fortnightly Review*, July, 1867.

been a glorious result of a right method in the study of Nature, that with the increase of knowledge the "human family has been endowed with new mercies." But every now and then, for a time at least, from "the unlocking of the gates of sense, and the kindling of a greater natural light, incredulity and intellectual night *have* arisen in our minds."*

But let us observe exactly where and how the difficulty arises. The Reign of Law in Nature is, indeed, so far as we can observe it, universal. But the common idea of the Supernatural is that which is at variance with Natural Law, above it, or in violation of it. Nothing, however wonderful, which happens according to Natural Law, would be considered by any one as Supernatural. The law in obedience to which a wonderful thing happens may not be known; but this would not give it a supernatural character, so long as we assuredly believe that it did happen according to *some* law. Hence, it would appear to follow that a man thoroughly possessed of the idea of Natural Law as universal, never could admit anything to be supernatural; because on seeing any fact, however new, marvellous, or incomprehensible, he would escape into the conclusion that it was the result of some natural Law of which he had before been ignorant. No one will deny that, in respect to the vast majority of all new and marvellous phenomena, this would be the true and reasonable conclusion. It is not the conclusion of pride, but of humility of mind. Seeing the boundless extent of our ignorance of the natural laws which regulate so many of the phenomena around us, and still more of so many of the phenomena within us, nothing can be more reasonable than to conclude, when we see something which is to us a wonder, that somehow, if we only knew how, it is "all right"—all according to the constitution and course of Nature. But then, to justify this conclusion, we must understand Nature in the largest sense,—as including all that is

> "In the round ocean, and the living air
> And the blue sky, *and in the mind of man.*"
> "*Tintern Abbey.*"—WORDSWORTH.

* "This also we humbly beg, that human things may not prejudice such as are Divine, neither that from the unlocking of the gates of sense, and the kindling of a greater natural light, anything of incredulity or intellectual night may arise in our minds towards Divine mysteries."—"The Student's Prayer." *Bacon's Works.*

We must understand it as including every agency which we see entering, or can conceive from analogy as capable of entering, into the causation of the world. First and foremost among these is the agency of our own Mind and Will. Yet, strange to say, all reference to this agency is often tacitly excluded when we speak of the laws of Nature. One of our most distinguished living teachers of physical science, Prof. Tyndall, began, not long ago, a course of lectures on the phenomena of Heat by a rapid statement of the modern doctrine of the Correlation of Forces—how the one was convertible into the other—how one arose out of the other—how none could be evolved except from some other as a pre-existing source. "Thus," said the lecturer, "we see there is no such thing as spontaneousness in Nature." What!—not in the lecturer himself? Was there no "spontaneousness" in his choice of words—in his selection of materials—in his orderly arrangement of experiments with a view to the exhibition of particular results? It is not probable that the lecturer was intending to deny this; it simply was that he did not think of it as within his field of view. His own Mind and Will were then dealing with the "laws of Nature," but they did not occur to him as forming part of those laws, or, in the same sense, as subject to them.

Does Man, then, not belong to Nature? Is he above it—or merely separate from it, or a violation of it? Is he supernatural? If so, has he any difficulty in believing in himself? Of course not. Self-consciousness is the one truth, in the light of which all other truths are known. *Cogito, ergo sum*, or *volo, ergo sum*—this is the one conclusion which we cannot doubt, unless Reason disbelieves herself. Why, then, are the faculties of the human mind and body not habitually included among the "laws of Nature?" Because a fallacy is getting hold upon us from a want of definition in the use of terms. "Nature" is being used in the narrow sense of physical nature. It is conceived as containing nothing beyond the properties of Matter. Thus the whole mental world in which we ourselves live, and move, and have our being, is excluded from it. But these selves of ours do belong to Nature. At all events if we are ever to understand the difficulties in the way of believing

in the Supernatural, we must first keep clearly in view what we intend to understand as included in the Natural. Let us never forget, then, that the agency of Man is of all others the most natural—the one with which we are most familiar—the only one, in fact, which we can be said, even in any measure, to understand. When any wonderful event can be referred to the contrivance or ingenuity of Man, it is thereby at once removed from the sphere of the Supernatural, as ordinarily understood.

It must be remembered, however, that we are now only seeking a clear definition of terms; and that provided this other meaning be clearly agreed upon, the Mind and Will of Man may be considered as separate from "nature," and belonging to the Supernatural. This view is taken in an able treatise on "Nature and the Supernatural," by Dr. Bushnell, an American clergyman.* Dr. Bushnell says:—"That is supernatural, whatever it be, that is either not in the chain of natural cause and effect, or which acts on the chain of cause and effect in nature, from without the chain." Again:—"If the processes, combinations, and results of our system of nature are interrupted or varied by the action, whether of God, or angels, *or men*, so as to bring to pass what would not come to pass in it by its own internal action, under the laws of mere cause and effect, such variations are in like manner supernatural." There is no other objection to this definition of the Supernatural, than that it rests upon a limitation of the terms "Nature" and "natural," which is very much at variance with the sense in which they are commonly understood. There is, indeed, a distinction which finds its expression in common language between the works of Man and the works of Nature. A honeycomb, for example, would be called a work of Nature, but a steam-engine would not. This distinction is founded on a true perception of the fact that the Mind and Will of Man belong to an order of existence very different from physical laws, and very different also from the fixed and narrow instincts of the lower animals. It is a distinction bearing witness to the universal consciousness that the Mind of Man has

* "Nature and the Supernatural, as together constituting the one System of God." By Horace Bushnell, D.D. Edinburgh, 1860.

within it something of a truly creative energy and force—that we are in a sense "fellow-workers with God," and have been in a measure "made partakers of the Divine nature." Nevertheless, it would be using the word in a sense very different from that in which it is generally accepted, were we to call the steam-engine a supernatural work. Yet it does answer strictly to the definition of Dr. Bushnell in being "the result of natural Law varied by the action of men." It is made by "acting on the chain of cause and effect in nature from without the chain." But then, be it observed, that under the same definition all the contrivances of Nature become Supernatural the moment they are conceived as the work of a Mind using what we call the elements of nature for the accomplishment of its designs. If, for example, it is open to us to conceive that such a creature as a Bee cannot have been made out of those elements "by their own internal action," then we must regard both this creature and the wonderful products of its instinct as belonging to the Supernatural. The honeycomb and the steam-engine would thus come under the same category—with this only difference, that the mind which made the steam-engine, being connected with a Body, is visibly known to us, whereas the Mind which made the Bee is withdrawn from sight. But both can be equally regarded as the result of Mind "acting on the chain of cause and effect from without the chain." Nor can we stop here. The same process of analysis will carry us farther in the same direction. We often speak, as Dr. Bushnell does here, of the elementary forces of Nature as "acting" by themselves. But there is no other meaning in these words than an expression of the fact that we neither see nor understand the connection of those elementary forces and Mind. But this ignorance of ours affords no manner of presumption that such connection does not exist. On the contrary, though the manner of that connection be unknown, it is much more conceivable to us that some connection does exist than that it does not. If therefore the distinction between the Natural and the Supernatural be the distinction between that which is and that which is not the work of Mind, then it becomes a purely arbitrary distinction. It assumes that we can distinguish between cases in which the properties of matter work

under the direction of Mind, and other cases in which they work "of themselves." But this is a line which we draw for ourselves. There is no reason to suppose that it has any reality in the constitution of things. It is not in those things, but in the point of view from which we regard them, that the distinction lies. We have only to change that point of view, and the distinction vanishes. All Nature becomes Supernatural, because all her elements, both in themselves and in their combinations, are only conceivable as first established, and then employed by the powers of Mind.

But if this definition of the Supernatural displeases us, as tending to confound distinctions which we had thought were clear, let us take another definition. Let us take the Natural in that larger and wider sense, in which it contains within it the whole phenomena of Man's intellectual and spiritual nature, as part, and the most familiar of all parts of the visible system of things. This is a definition more consonant with common language. In all ordinary senses of the term, Man and his doings belong to the Natural, as distinguished from the Supernatural.

We are now from another point of view coming nearer to some precise understanding of what the Supernatural may be supposed to mean. But before we proceed, there is another question which must be answered—What is the relation in which the agency of Man stands to the physical laws of Nature? The answer, in part at least, is plain. His power in respect to those laws extends only, first to their discovery and ascertainment, and then to their use. He can establish none: he can suspend none. All he can do is to guide, in a limited degree, the mutual action and reaction of the laws amongst each other. They are the tools with which he works—they are the instruments of his Will. In all he does or can do he must employ them. His ability to use them is limited both by his want of knowledge and by his want of power. The more he knows of them, the more largely he can employ them, and make them ministers of his purposes. This, as a general rule, is true; but it is subject to the second limitation just pointed out. Our power over Nature does not necessarily keep pace with our knowledge of her Laws. Man already knows far more than he

has power to convert to use. It is a true observation of Sir George Lewis,* that Astronomy, for example, in its higher branches, has an interest almost purely scientific. It reveals to our knowledge perhaps the grandest and most sublime of the physical laws of Nature. But a much smaller amount of knowledge would suffice for the only practical applications which we have yet been able to make of these laws to our own use. Still, that knowledge has a reflex influence on our knowledge of ourselves, of our powers, and of the relations which subsist between the constitution of our own minds and the constitution of the universe. And in other spheres of inquiry, advancing knowledge of physical laws has been constantly accompanied with advancing power over the physical world. It has enabled us to do a thousand things, any one of which, a few generations ago, would have been considered supernatural. Nor can it be said that this judgment of their character would have been erroneous. These things would have been superhuman then, though they are not superhuman now. The same lecturer who told his audience that there was nothing spontaneous in Nature proceeded, by virtue of his own knowledge of natural laws, and by his selecting and combining power, to present a whole series of phenomena—such as ice frozen in contact with red-hot crucibles—which certainly did not belong to the "ordinary course of Nature." Such an exhibition a few centuries ago would, beyond all doubt, have subjected the lecturer on Heat to painful experience of that condition of matter. Nevertheless the phenomena so exhibited were natural phenomena—in this sense, that they were the product of natural laws. Only these laws were combined in action under extraordinary conditions, and these conditions were governed by the purpose and design of the lecturer, which design was "spontaneous," if there is any meaning in the word. In like manner, if the progress of discovery is as rapid during the next four hundred years as it has been during the last period of the same extent, men will be able to do many things which would now appear to be "supernatural." There is no difficulty in conceiving how a complete knowledge of all natural laws would give, if not complete power, at least degrees of power, immensely greater

* "Astronomy of the Ancients," p. 254.

than those which we now possess. Power of this kind, then, however great in degree, clearly does not answer that idea of the Supernatural which so many reject as inconceivable. What, then, is that idea? Have we not traced it to its den at last? By "supernatural" power, do we not mean power independent of the use of means, as distinguished from power depending on knowledge—even infinite knowledge—of the means proper to be employed?

This is the sense—probably the only sense—in which the Supernatural is, to many minds, so difficult of belief. No man can have any difficulty in believing that there are natural laws of which he is ignorant; nor in conceiving that there may be Beings who do know them, and can use them, even as he himself now uses the few laws with which he is acquainted. The real difficulty lies in the idea of Will exercised without the use of means—not in the idea of Will exercised through means which are beyond our knowledge, or beyond our reach.

Now, have we any right to say that belief in *this* is essential to all Religion? If we have not, then, it is only putting, as so many other hasty sayings do put, additional difficulties in the way of Religion. The relation in which God stands to those rules of His government which are called "laws," is, of course, an inscrutable mystery to us. But the very idea of a Creator involves the idea not merely of a Being by whom the properties of Matter are employed, but of a Being from whose Will the properties of Matter are derived. This, indeed, is the proper work of Creation, as nearly as we can form a conception of it. It is true that in forming this conception we pass beyond the bounds of our own experience, because "we pass from that in God of which there is an image in Man, to that which is distinctive of God as God." But this we must do in forming any idea of a God at all. We must conceive the Creator as first giving existence to the means, and then using them for the accomplishment of ends. "We cannot conceive of the original relation of this Universe to God as that of an infinite multitude of laws to an infinite Mind, having (only) perfect knowledge of them, and using this knowledge in turning them to account, in accomplishing designs of infinite wisdom. We cannot conceive of infinite wisdom thus, as it were, finding in-

finite resources already existing."* All this is true. But those who believe that God's Will does govern the world, must believe that ordinarily, at least, He does govern it by the choice and use of means,—which means were again pre-established by Himself. Nor have we any certain reason to believe that He ever acts otherwise. Extraordinary manifestations of His Will —signs and wonders—may be wrought, for aught we know, by similar instrumentality—only by the selection and use of laws of which Man knows and can know nothing, and which, if he did know, he could not employ.†

Here, then, we come upon the question of miracles—how we understand them? what we would define them to be? The common idea of a miracle is, a suspension or violation of the laws of Nature. This is a definition which places the essence of a miracle in a particular method of operation. But there is another definition which passes over the question of method altogether, and dwells only on the agency by which, and the purpose for which, a wonderful work is wrought. "We would confine the word miracle," says Dr. M'Cosh,‡ "to those events which were wrought in our world as a sign or proof of God making a supernatural interposition, or a revelation to Man." The two most essential conditions in this view of a miracle, are that it is a work wrought by a Divine power for a Divine purpose, and is of a nature such as could not be wrought by merely human contrivance. This definition of a miracle does not necessarily exclude the idea of God working by the use of means, provided they are such means as are out of human reach. Indeed,

* I am glad to be able to quote these passages from one of my earliest and most valued friends, the Rev. J. McLeod Campbell. They occur in an Introduction to a new edition of his work on the "Nature of the Atonement" (Macmillan and Co., 1867) —an Introduction marked by characteristic depth of thought and feeling.

† This chapter, originally published as an article in the *Edinburgh Review* for Oct. 1862, has been referred to in the remarkable work of Mr. Lecky on "The Rise and Influence of Rationalism in Europe" (vol. i. ch. ii. p. 195 note), as conveying "a notion of a miracle which would not differ *generically* from a human act, though it would still be strictly available for evidential purposes." I am quite satisfied with this definition of the result. Beyond the immediate purposes of benevolence, which were served by almost all the miracles of the New Testament, the only other purpose which is ever assigned to them is an "evidential purpose"—that is, a purpose that they might serve as signs of the presence of superhuman knowledge, and of the working of superhuman power. They were performed—in short—to assist faith, and not to confound reason.

‡ "The Supernatural in Relation to the Natural." By the Rev. James M'Cosh, LL.D. Macmillan, Cambridge, 1862.

in an important note (p. 149), Dr. M'Cosh explains that miracles are not to be considered "as against Nature" in any other sense than that in which "one natural agent may be against another —as water may counteract fire." This eminent writer has approached the subject by the right method, because he has addressed himself first to the solution of the one question which is an essential preliminary to all subsequent discussion :—"How much is contained in the Natural?" Not until this question is answered, can the Supernatural be defined. Yet the answer given by Dr. M'Cosh shows the inherent and the insuperable difficulty which attends the giving of any answer at all. "In this world," he says, "there is a set of objects and agencies which constitute a system or Cosmos which may have relations to regions beyond, *but is all the while a self-contained sphere, with a space around it—an Island so far separated from other lands.* This system we call Nature" (p. 101). This definition of the Natural is perhaps as accurate and as full as any that can be given. It assumes, however, that the boundaries of the Natural are known. But the essential difficulty of separating between the Natural and the Supernatural is this—that the boundaries of the Natural are *not* known—that we cannot trace the shores of this "island"—that even if we could see any distinct separation between them and the space around them, we have not explored the "island" itself completely, and therefore we cannot say of any agency working therein, that it comes from beyond the Sea. Mr. Mansel, in his "Essay on Miracles," adopts the word "superhuman" as the most accurate expression of his meaning. He says, "A superhuman authority needs to be substantiated by superhuman evidence; *and what is superhuman is miraculous.*"* It is important to observe that this definition does not necessarily involve the idea of a "violation of the laws of Nature." It does not involve the idea of the exercise of Will apart from the use of means. It does not imply any exception to the great law of causation. It does not involve, therefore, that idea which appears to many so difficult of conception. It simply supposes, without any attempt to

* "Aids to Faith," p. 35. In another passage (p. 21), Mr. Mansel says, that in respect to the great majority of the miracles recorded in Scripture, "the supernatural element appears . . . in the exercise of a personal power transcending the limits of man's will. They are not so much *supermaterial* as *superhuman*."

fathom the relation in which God stands to His own "laws," that out of His infinite knowledge of these laws, or of His infinite power of making them the instruments of His Will, He may and He does use them for extraordinary indications of His presence.*

The reluctance to admit, as belonging to the domain of Nature, any special exertion of Divine power for special purposes, stands really in very close relationship to the converse notion, that where the operation of natural causes can be clearly traced, there the exertion of Divine power and Will is rendered less certain and less convincing. This is the idea which lies at the root of Gibbon's famous chapters on the spread of Christianity. He labors to prove that it was due to natural causes. In proving this, he evidently thinks he is disposing of the notion that Christianity spread by Divine power; whereas he only succeeds in pointing out some of the means which were employed to effect a Divine purpose. In like manner, the preservation of the Jews as a distinct People during so many centuries of complete dispersion, is a fact standing nearly, if not absolutely, alone in the history of the world. It is at variance with all other experience of the laws which govern the amalgamation with each other of different families of the human race. The case of the Gypsies has been referred to as somewhat parallel. But the facts of this case are doubtful and obscure, and such of them as we know involve conditions altogether dissimilar in kind. It is not surprising, therefore, that the preservation of the Jews, partly from the relation in which it stands to the apparent fulfilment of Prophecy, and partly from the extraordinary nature of the fact itself, is tacitly assumed by many persons to come strictly within the category of miraculous events. Yet in itself it is nothing more than a striking illustration how a departure from the "ordinary course of nature" may be effected through the instrumentality of means which are natural and comprehensible. An extraordinary resisting power has

* I agree with Mr. J. M. Campbell when he says, in the Introduction already quoted, "It appears to me that we do not know enough to say, as regards anything transcending our knowledge of Law, in which way we should view it—whether as belonging to the system of Law, but to a region of it out of our sight, or as outside of that system, and as having the same immediate relation to God which the system of Law ultimately has."—P. xxxv.

been given to the Jewish People against those dissolving and disintegrating forces which have caused the disappearance of every other race placed under similar conditions. They have been torn from home and country, and removed, not in a body, but in scattered fragments, over the world. Yet they are as distinct from every other people now as they were in the days of Solomon. Nevertheless this resisting power, wonderful though it be, is the result of special laws, overruling those in ordinary operation. It has been effected by the use of means. Those means have been superhuman—they have been beyond human contrivance and arrangement. But they belong to the region of the Natural. They belong to it not the less, but all the more, because in their concatenation and arrangement they seem to indicate the purpose of a living Will seeking and effecting the fulfilment of its designs. This is the manner after which our own living wills in their little sphere effect their little objects. Is it difficult to believe that after the same manner also the Divine Will, of which ours is the image only, works and effects its purposes?

Our own experience shows that the universal Reign of Law is perfectly consistent with a power of making those laws subservient to design—even when the knowledge of them is but slight, and the power over them slighter still. How much more easy, how much more natural, to conceive that the same universality is compatible with the exercise of that Supreme Will before which all are known, and to which all are servants! What difficulty in this view remains in the idea of the Supernatural? Is it any other than the difficulty in believing in the existence of a Supreme Will—in a living God? If this be the belief of which M. Guizot speaks when he says that it is essential to religion, then his proposition is unquestionably true. In this sense the difficulty of believing in the Supernatural, and the difficulty of believing in pure Theism, is one and the same. But if he means that it is necessary to religion to believe in even the occasional "violation of law,"—if he means that without such belief, signs and wonders cease to be evidences of Divine power,—then he announces a proposition which cannot be sustained. There is nothing in Religion incompatible with the belief that all exercises of God's power, whether ordinary

or extraordinary, are effected through the instrumentality of means—that is to say, by the instrumentality of natural laws brought out, as it were, and used for a Divine purpose. To believe in the existence of miracles, we must indeed believe in the Superhuman and in the Supermaterial. But both these are familiar facts in Nature. We must believe also in a Supreme Will and a Supreme Intelligence; but this our own Will and our own Intelligence not only enable us to conceive of, but compel us to recognize in the whole laws and economy of Nature. Her whole aspect "answers intelligently to our intelligence—mind responding to mind as in a glass."* Once admit that there is a Being who—irrespective of any theory as to the relation in which the laws of Nature stand to His Will—has at least an infinite knowledge of those laws, and an infinite power of putting them to use—then miracles lose every element of inconceivability. In respect to the greatest and highest of all—that restoration of the breath of life which is not more mysterious than its original gift—there is no answer to the question which Paul asks, "Why should it be thought a thing incredible by you that God should raise the dead?"

This view of miracles is well expressed by Principal Tulloch:—

"The stoutest advocate of interference can mean nothing more than that the Supreme Will has so moved the hidden springs of nature that a new issue arises on given circumstances. The ordinary issue is supplanted by a higher issue. The essential facts before us are a certain set of phenomena, and a Higher Will moving them. How moving them? is a question for human definition; but the answer to which does not and cannot affect the Divine meaning of the change. Yet when we reflect that this Higher Will is everywhere reason and wisdom, it seems a juster as well as a more comprehensive view to regard it as operating by subordination and evolution rather than by 'interference' or 'violation.' According to this view, the idea of Law is so far from being contravened by the Christian miracles, that it is taken up by them and made their very

* "Beginning Life: Chapters for Young Men on Religion, Study, and Business, Chap. iii., The Supernatural" By John Tulloch, D.D., Principal of St. Mary's College, St. Andrew's. Edinburgh, 1860. P. 29.

basis. They are the expression of a Higher Law, working out its wise ends among the lower and ordinary sequences of life and history. These ordinary sequences represent nature—nature, however, not as an immutable fate, but a plastic medium through which a Higher Voice and Will are ever addressing us, and which, therefore, may be wrought into new issues when the Voice has a new message, and the Will a special purpose for us."*

It is well worthy of remark, that Locke, who laid great stress on the Christian miracles, as attesting the authority of those who wrought them, declines, nevertheless, to adopt the common definition of that in which miraculous agency consists. "A miracle then," he says,† "I take to be a sensible operation, which, being above the comprehension of the spectator and, *in his opinion*, contrary to the established course of nature, *is taken by him* to be Divine." And in reply to the objection, that this makes a miracle depend on the opinions or knowledge of the spectator, he points out that this objection cannot be avoided by any of the definitions commonly adopted; because "it being agreed that a miracle must be that which surpasses the force of nature in the established steady laws of cause and effect, nothing can be taken to be a miracle but *what is judged to exceed those laws.* Now every one being able to judge of those laws *only by his own acquaintance with nature*, and his own notions of its force, which are different in different men, it is unavoidable that that should be a miracle to one man which is not so to another." In this passage Locke recognizes the great truth, that we can never know what is above Nature unless we know all that is within Nature. But he misses another truth, quite as important,—that a miracle would still be a miracle even though we did know the laws through which it was accomplished, provided those laws, though not beyond human knowledge, were beyond human control. We might know the conditions necessary to the performance of a miracle, although utterly unable to bring those conditions about. Yet a work performed by the bringing about of conditions which are out of

* "Beginning Life," etc., pp. 85, 86. By John Tulloch, D.D.

† "A Discourse on Miracles."

human reach, would certainly be a work attesting superhuman power.

Nevertheless so deeply ingrained in popular theology is the idea that miracles, to be miracles at all, must be performed by some violation or suspension of the laws of Nature, that the opposite idea of miracles being performed by the use of means is regarded by many with jealousy and suspicion. Strange that it should be thought the safest course to separate as sharply and as widely as we can between what we are called upon to believe in Religion, and what we are able to trace or understand in Nature! With what heart can those who cherish this frame of mind follow the great argument of Butler? All the steps of that argument—the greatest in the whole range of Christian philosophy—are founded on the opposite belief, that all the truths, and not less all the difficulties of Religion, have their type and likeness in the "constitution and course of Nature." As we follow that reasoning, so simple and so profound, we find our eyes ever opening to some new interpretation of familiar facts, and recognizing among the curious things of earth, one after another of the laws which, when told us of the spiritual world, seem so perplexing and so hard to accept or understand. To ask how much further this argument of the "Analogy" is capable of illustration and development, is to ask how much more we shall know of Nature. Like all central truths, its ramifications are infinite—as infinite as the appearance of variety, and as pervading as the sense of oneness in the universe of God.

But what of Revelation? Are its history and doctrines incompatible with the belief that God uniformly acts through the use of means? The narrative of Creation is given to us in abstract only, and is told in two different forms, both having apparently for their main, perhaps their exclusive object, the presenting to our conception the personal agency of a living God. Yet this narrative indicates, however slightly, that room is left for the idea of a material process. "Out of the dust of the ground;" that is, out of the ordinary elements of Nature, was that Body formed which is still upheld and perpetuated by organic forces acting under the rules of Law. Nothing which Science has discovered, or can discover, is capable of traversing

that simple narrative. On this subject M. Guizot lays great stress, as many others do, on what he calls the Supernatural in Creation, as distinguished from the operations now visible in Nature. "De quelle façon et par quelle puissance le genre humain a-t-il commencé sur la terre?" In reply to this question, he proceeds to argue that Man must have been the result either of mere material forces, or of a supernatural power exterior to, and superior to Matter. Spontaneous generation, he argues, supposing it to exist at all, can give birth only to infant beings —to the first hours, and feeblest forms of nascent life. But Man—the human pair—must evidently have been complete from the first; created in the full possession of their powers and faculties. "C'est à cette condition seulement qu'en apparaissant pour la première fois sur la terre l'homme aurait pu y vivre—s'y perpétuer, et y fonder le genre humain. Evidemment l'autre origine du genre humain est seul admissible, seul possible. Le fait surnaturel de la création explique seul la première apparition de l'homme ici-bas."

This is a common but not a very safe argument. If the Supernatural—that is to say, the Superhuman and the Supermaterial—cannot be found nearer to us than this, it will not be securely found at all. It is very difficult to free ourselves from this notion that by going far enough back, we can "find out God" in some sense in which we cannot find Him now. The certainty not merely of one, but of many successive Creations in the history of our Planet, and especially of a time comparatively recent, when Man did not exist, is indeed an effectual answer to the notion, if it be now ever entertained, of "all things having continued as they are since the Beginning." But those who believe that the existing processes of Nature can be accounted for by "Law," may believe that those processes were also commenced by the same vague and mysterious agency. To accept the primeval narrative of the Jewish Scriptures as coming from authority, and as bringing before us the personal agency of the Creator, but without purporting to reveal the method of His work,—this is one thing. To argue that no other origin for the first parents of the human race is conceivable than that they were moulded perfect, without the instrumentality of any means,—this is quite another thing. The various hypotheses of

Development, of which Darwin's theory is only a new and special version, whether they are probable or not, are at least advanced as affording a possible escape from the puzzle which M. Guizot puts. These hypotheses are indeed destitute of proof; and in the form which they have as yet assumed, it may justly be said that they involve such violations of, or departures from, all that we know of the existing order of things, as to deprive them of all scientific basis. But the close and mysterious relations between the mere animal frame of Man, and that of the lower animals, does render the idea of a common relationship by descent at least conceivable. Indeed, in proportion as it seems to approach nearer to processes of which we have some knowledge, it is, in a degree, more conceivable than Creation without any process,—of which we have no knowledge and can have no conception.

But whatever may have been the method or process of Creation, it is Creation still. If it were proved to-morrow that the first man was "born" from some pre-existing Form of Life, it would still be true that such a birth must have been, in every sense of the word, a new Creation. It would still be as true that God formed him "out of the dust of the earth," as it is true that He has so formed every child who is now called to answer the first question of all theologies. And we must remember that the language of Scripture nowhere draws, or seems even conscious of, the distinction which modern philosophy draws so sharply between the Natural and the Supernatural. All the operations of Nature are spoken of as operations of the Divine Mind. Creation is the outward embodiment of a Divine idea. It is in this sense, apparently, that the narrative of Genesis speaks of every plant being formed "before it grew." But the same language is held, not less decidedly, of every ordinary birth. "Thine eyes did see my substance, yet being imperfect. In Thy book all my members were written, which in continuance were fashioned, when as yet there were none of them." And these words, spoken of the individual birth, have been applied not less truly to the modern idea of the Genesis of all Organic Life. Whatever may have been the physical or material relation between its successive forms, the ideal relation has been now clearly recognized, and reduced to scientific definition.

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All the members of that frame which has received its highest interpretation in Man, had existed, with lower offices assigned to them, in the animals which flourished before Man was born. All theories of Development have been simply attempts to suggest the manner in which, or the physical process by means of which this ideal continuity of type and pattern has been preserved. But whilst all these suggestions have been in the highest degree uncertain, some of them violently absurd, the one thing which is certain is the fact for which they endeavor to account. And what is that fact? It is one which belongs to the world of Mind, not to the world of Matter. When Professor Owen tells us, for example, that certain jointed bones in the Whale's paddle are the same bones which in the Mole enable it to burrow, which in the Bat enable it to fly, and in Man constitute his hand with all its wealth of functions, he does not mean that physically and actually they are the same bones, nor that they have the same uses, nor that they ever have been, or ever can be, transferable from one kind of animal to another. He means that in a purely ideal or mental conception of the plan of all Vertebrate skeletons, these bones occupy the same relative place—relative, that is, not to origin or use, but to the Plan or conception of that skeleton as a whole.

Here the Supermaterial, and in this sense the Supernatural, element,—that is to say, the ideal conformity and unity of conception, is the one unquestionable fact, in which we recognize directly the working of a Mind with which our own has very near relations. Here, as elsewhere, we see the Natural, in the largest sense, including and embodying the Supernatural; the Material, including the Supermaterial. No possible theory, whether true or false, in respect to the physical means employed to preserve the correspondence of parts which runs through all Creation, can affect the certainty of that mental plan and purpose which alone makes such correspondence intelligible to us, and in which alone it may be said to exist.

It must always be remembered that the two ideas,—that of a Physical Cause and that of a Mental Purpose,—are not antagonistic; only the one is larger and more comprehensive than the other. Let us take a case. In many animal frames there are what have been called "silent members"—members

which have no reference to the life or use of the animal, but only to the general pattern on which all vertebrate skeletons have been formed. Mr. Darwin, when he sees such a member in any animal, concludes with certainty that this animal is the lineal decendant by ordinary generation of some other animal in which that member was not silent but turned to use. Professor Owen, taking a larger and wider view, would say, without pretending to explain *how* its presence is to be accounted for physically, that the silent member has relation to a general purpose or plan which can be traced from the dawn of Life, but which did not receive its full accomplishment until Man was born. This is certain: the other is a theory. The assumed physical cause may be true or false. But in any case the mental purpose and design—the conformity to an abstract idea—this is certain. The relation in which created Forms stand to our own mind and to our understanding of their Purpose, is the one thing which we can surely know, because it belongs to our own consciousness. It is entirely independent of any belief we may entertain, or any knowledge we may acquire, of the processes employed for the fulfilment of that Purpose.

And yet scientific men sometimes tell us that "we must be very cautious how we ascribe intention to nature. Things do fit into each other, no doubt, as if they were designed; but all we know about them is that these correspondences exist, and that they seem to be the result of physical laws of development and growth." Very likely; but how these correspondences have arisen, and are daily arising, is not the question, and it is immaterial how that question may be answered. Do those correspondences exist, or do they not? The perception of them by our mind is as much a fact as the sight or touch of the things in which they appear. They may have been produced by growth—they may have been the result of a process of development,—but it is not the less the development of a mental purpose. It is the end subserved that we absolutely know. What alone is doubtful and obscure is precisely that which we are told is the only legitimate object of our research,—viz., the means by which that end has been attained. Take one instance out of millions. The poison of a deadly snake—let us for a moment consider what this is. It is a secretion of

definite chemical properties which have reference, not only—not even mainly—to the organism of the animal in which it is developed, but specially to the organism of another animal which it is intended to destroy. Some naturalists have a vague sort of notion that, as regards merely mechanical weapons, or organs of attack, they may be developed by use,—that legs may become longer by fast running, teeth sharper and longer by much biting. Be it so: this law of growth, if it exist, is but itself an instrument whereby purpose is fulfilled. But how will this law of growth adjust a poison in one animal with such subtle knowledge of the organization of another that the deadly virus shall in a few minutes curdle the blood, benumb the nerves, and rush in upon the citadel of life? There is but one explanation—a Mind, having minute and perfect knowledge of the structure of both, has designed the one to be capable of inflicting death upon the other. This mental purpose and resolve is the one thing which our intelligence perceives with direct and intuitive recognition. The method of creation, by means of which this purpose has been carried into effect, is utterly unknown.

It is no answer or objection to this view that poisons exist also in plants and minerals where no similar adjustment to function is perceived.* Even in these cases there are wonderful relations between our own human frame and many poisons of the mineral and vegetable world which render them invaluable agents in the mitigation of suffering and the prevention or removal of disease. It is impossible to believe that these complicated relations of action and reaction between things separated apparently from each other by the whole width of being, have been the result of forces with which Mind and Prevision have had no concern. But even if the use of such poisons were absolutely unknown—even if that use lay, which it does not, beyond the possibility of our conception,—this would not deduct by the value of a fraction from the certainty of a conclusion which is founded on different conditions. The relations of adjustment between a given number of elements

* "To what intention are we to ascribe the poisons liberally distributed through plants and minerals?" asks Mr. G. H. Lewes in his review of this work.—*Fortnightly Review*, July 1867, p. 100.

are none the less a certain fact because similar elements may be found elsewhere without any such adjustment being visible to us. It is the very fact of their not being separate but combined in the one case which justifies and compels a conclusion different from that which arises in the other case. This is the law of evidence on which we act and judge in other matters with conviction which is both intuitive and capable of being confirmed by the rules of reason. And this reply is applicable to all objections of the same kind. Those portions of the system of Nature which are wholly dark to us do not necessarily cast any shadow on those other portions of that system which are luminous with inherent light. Rather the other way. The shining tracts which thus reflect the light of Reason and of Mind send abundant rays into all the dark places round them. The new discoveries which Science is ever making of adjustments and combinations, of which we had no previous conception, impress us with an irresistible conviction that the same relations to Mind prevail throughout. It matters not in what department of investigation inquiry is conducted, it matters not what may be the Philosophy or Theology of the inquirer. Every step he takes he finds himself face to face with facts which he cannot describe intelligibly either to himself or others, except by referring them to that function and power of Mind which we know as Purpose and Design.

Perhaps no illustration more striking of this principle was ever presented than in the curious volume published by Mr. Darwin on the "Fertilization of Orchids."* It appears that the fertilization of almost all Orchids is dependent on the transport of the pollen from one flower to another by means of insects. It appears, further, that the structure of these flowers is elaborately contrived, so as to secure the certainty and effectiveness of this operation. Mr. Darwin's work is devoted to tracing in detail what these contrivances are. To a large extent they are purely mechanical, and can be traced with as much clearness and certainty as the different parts of which a steam-engine is composed. The complication and ingenuity of these contrivances almost exceed belief. "Moth-traps and

* "On the Various Contrivances by which British and Foreign Orchids are Fertilized by Insects." By Charles Darwin, F.R.S., London, 1862.

spring-guns set on these grounds," might be the motto of the Orchids. There are baits to tempt the nectar-loving Lepidoptera, with rich odors exhaled at night, and lustrous colors to shine by day; there are channels of approach along which they are surely guided, so as to compel them to pass by certain spots; there are adhesive plasters nicely adjusted to fit their probosces, or to catch their brows; there are hair triggers carefully set in their necessary path, communicating with explosive shells, which project the pollen-stalks with unerring aim upon their bodies. There are, in short, an infinitude of adjustments, for an idea of which I must refer my readers to Mr. Darwin's inimitable powers of observation and description—adjustments all contrived so as to secure the accurate conveyance of the pollen of the one flower to its precise destination in the structure of another.

Now there are two questions which present themselves when we examine such a mechanism as this. The first is, What is the use of the various parts, or their relation to each other with reference to the purpose of the whole? The second question is, How were those parts made, and out of what materials? It is the first of these questions—that is to say, the use, object, intention, or purpose of the different parts of the plant—which Darwin sets himself instinctively to answer first; and it is this which he does answer with precision and success. The second question,—that is to say, how those parts came to be developed and out of what "primordial elements" they have been derived in their present shapes, and converted to their present uses—this is a question which Darwin does also attempt to solve, but the solution of which is in the highest degree difficult and uncertain. It is curious to observe the language which this most advanced disciple of pure naturalism instinctively uses when he has to describe the complicated structure of this curious order of plants. "Caution in ascribing intentions to nature," does not seem to occur to him as possible. Intention is the one thing which he does see, and which, when he does not see, he seeks for diligently until he finds it. He exhausts every form of words and of illustration by which intention or mental purpose can be described. "Contrivance"—"curious contrivance"—"beautiful contrivance,"—these are expressions which

recur over and over again. Here is one sentence describing the parts of a particular species: "The Labellum is developed into a long nectary, *in order* to attract Lepidoptera, and we shall presently give reasons for suspecting that the nectar is *purposely* so lodged that it can be sucked only slowly, *in order* to give time for the curious chemical quality of the viscid matter setting hard and dry."* Nor are these words used in any sense different from that in which they are applicable to the works of Man's contrivance—to the instruments we use or invent for carrying into effect our own preconceived designs. On the contrary, human instruments are often selected as the aptest illustrations both of the object in view, and of the means taken to effect it. Of one particular structure, Mr. Darwin says: "This contrivance of the guiding ridges may be compared to the little instrument sometimes used for guiding a thread into the eye of a needle." Again, referring to the precautions taken to compel the insects to come to the proper spot, in order to have the "pollinia" attached to their bodies, Mr. Darwin says: "Thus we have the rostellum partially closing the mouth of the nectary, *like a trap placed in a run for game*,—and the trap so complex and perfect!"† But this is not all. The idea of special use, as the controlling principle of construction, is so impressed on Mr. Darwin's mind, that, in every detail of structure, however singular or obscure, he has absolute faith that in this lies the ultimate explanation. If an organ is largely developed, it is because some special purpose is to be fulfilled. If it is aborted or rudimentary, it is because that purpose is no longer to be subserved. In the case of another species whose structure is very singular, Mr. Darwin had great difficulty in discovering how the mechanism was meant to work, so as to effect the purpose. At last he made it out, and of the clue which led to the discovery he says: "The strange position of the Labellum perched on the summit of the column, ought to have shown me that here was the place for experiment. I ought to have scorned the notion that the Labellum was thus placed *for no good purpose*. I neglected this plain guide, and for a long time completely failed to understand the flower."‡

* P. 29. † P. 30. ‡ P. 262.

An attempt has, indeed, been made to explain away Mr. Darwin's language in such cases as "metaphorical."* But this explanation is powerless to expel from that language the inference it involves. Indeed, it is an explanation which only repeats the same idea in another form. The very essence of a metaphor is that it expresses the resemblances of things. But it is in seeing the resemblances, and in seeing the correlative differences of things, that all knowledge consists. This perception is the raw material of Thought—it is the foundation of all intellectual apprehension. In proportion as resemblances are complete, the language which expresses those resemblances is the language of truth. Such language very often carries within it the most certain conclusions which are accessible to reason. One mind looking at the workings of another mind can see likeness of agency only by recognizing likeness in the processes of thought. That likeness can only be expressed in words which convey the idea of it to other minds. But in this sense all language is metaphorical. The commonest words we use to indicate ideas are essentially metaphorical, bringing home into the world of Mind images derived from material force, and carrying forth again into the outward world conceptions born of that mental power which alone is capable of conceiving. In one aspect, all human speech is what the Poet calls it, "Matter-moulded forms of speech."† In another aspect it is all spirit-moulded, since we can only think of Matter in the light of those impressions which it has power to make on Mind. All language is thus but a system of signs whereby we express the analogies—the differences and resemblances perceived by us in those two great departments of Nature of which the union and the separation are both imaged in ourselves—that is, in the union and in the difference of the Body and the Mind. The most absolute certainties we can ever know are only known by the translation of ideas or conceptions from one of these departments to the other, and the language in which these certainties are expressed carries, and must carry,

* *Quarterly Journal of Science*, Oct. 1867. "Creation by Law," by Alfred Wallace. "Mr. Darwin has laid himself open to much misconception, and has given to his opponents a powerful weapon by his continual use of metaphor in describing the wonderful coadaptations of organic beings."—P. 473.

† "In Memoriam," xciv.

signs of this origin in itself. The question, therefore, in respect to Mr. Darwin's language, is not whether it is "metaphorical" —that is, whether it applies to material phenomena conceptions derived from the world of Mind. This, of course, it does, and in the nature of the case it must do. But the question is, whether the correspondence it expresses between the order of these material phenomena and a known order of Thought is or is not a real correspondence, and one, therefore, indicating the known effects of a known originating cause.

And here it is well worthy of observation, that although Purpose and Intention are, of course, involved in all mental operations, yet the conception of contrivance is not the only mental conception which, in like manner, is recognized as constituting the order of natural phenomena. Other conceptions equally familiar to the mind of Man are instinctively recognized by all Naturalists who bring high intellectual powers into that contact with Nature which consists in close and thoughtful observation of her facts. Other mental conceptions, such as those of Number and Proportion, are then found to emerge, and make an ineffaceable impression on the mind which sees them.

Thus, when we come to the second part of Mr. Darwin's work, viz., the Homology of the Orchids, we find that the inquiry divides itself into two separate questions,—first, the question what all these complicated organs are in their primitive relation to each other; and, secondly, how these successive modifications have arisen, so as to fit them for new and changing uses. Now, it is very remarkable that of these two questions, that which may be called the most abstract and transcendental—the most nearly related to the Supernatural and the Supermaterial—is again precisely the one which Darwin is able to solve most clearly. We have already seen how well he solves the first question—What is the use and intention of these various parts? The next question is, What are these parts in their primal order and conception? The answer is, that they are members of a numerical group, having a definite and still traceable order of symmetrical arrangement. They are expressions of a numerical idea, as so many other things—perhaps as all things—of beauty are. Mr. Darwin gives a diagram, showing the primordial or archetypal arrangement of Threes within

Threes, out of which all the strange and marvellous forms of the Orchids have been developed, and to which, by careful counting and dissection, they can still be ideally reduced. But when we come to the last question—By what process of natural consequence have these elementary organs of Three within Three been developed into so many various forms of beauty, and made to subserve so many curious and ingenious designs? —we find nothing but the vaguest and most unsatisfactory conjectures. Let us take one instance as an example. There is a Madagascar Orchis—the "Angræcum sesquipedale"—with an immensely long and deep nectary. How did such an extraordinary organ come to be developed? Mr. Darwin's explanation is this: The pollen of this flower can only be removed by the proboscis of some very large Moth trying to get at the nectar at the bottom of the vessel. The Moths with the longest probosces would do this most effectually; they would be rewarded for their long noses by getting the most nectar; whilst, on the other hand, the flowers with the deepest nectaries would be the best fertilized by the largest Moths preferring them. Consequently, the deepest-nectaried Orchids, and the longest-nosed Moths, would each confer on the other a great advantage in the "battle of life." This would tend to their respective perpetuation, and to the constant lengthening of nectaries and of noses. But the passage is so curious and characteristic, that it is well to give Mr. Darwin's own words:—

"As certain Moths of Madagascar became larger, through natural selection in relation to their general conditions of life, either in the larval or mature state, or as the proboscis alone was lengthened to obtain honey from the Angræcum, those individual plants of the Angræcum which had the longest nectaries, (and the nectary varies much in length in some Orchids,) and which, consequently, compelled the Moths to insert their probosces up to the very base, would be the best fertilized. These plants would yield most seed, and the seedlings would generally inherit longer nectaries; and so it would be in successive generations of the plant and Moth. Thus it would appear that there has been a race in gaining length between the nectary of the Angræcum and the proboscis of certain Moths; but the Angræcum has triumphed, for it flourishes and abounds

in the forests of Madagascar, and still troubles each Moth to insert its proboscis as far as possible in order to drain the last drop of nectar. . . . We can thus," says Mr. Darwin, "*partially* understand how the astonishing length of the nectary may have been acquired by successive modifications."

It is indeed but a "partial" understanding.* How came this Orchis to require any exact adjustment between the length of its nectary and the proboscis of an insect? This is not a general necessity even among the Orchids. "In the British species, such as Orchis Pyramidalis, it is not necessary that any such adjustment should exist, and thus a number of insects of various sizes are found to carry away the pollinia, and aid in the fertilization."† This would obviously be the most favorable condition for all Orchids in the battle of life. Does not the hypothesis, then, begin by assuming the very condition of things for which it professes to account? We must start with this Madagascar Orchis already in possession of a larger nectary than other species, and with a structure already depending on particular Moths also already existing, and already provided with probosces of nicely adjusted length. If the nectaries began first to lengthen, how came the Moths not to leave them for other flowers? And if, on the contrary, they began to shorten, how came they not to be favored and resorted to by other Moths of a smaller size? Can we assume that somehow there were always ready some Moths still larger to favor the longer variety, and that somehow also there were no smaller Moths to favor the shorter? ‡ Why should the race *in this particular species* be always in the direction of nectaries getting longer, and not rather in the direction of nectaries getting shorter? Obviously the same hypothesis might be so turned as to account for either result with equal ease, and therefore it does not account at all for one of those results as against the

*The passage which follows I have added to meet the objection taken by Mr. Wallace, that I have "not shown what point the explanation fails to meet." A sample only of such points can be given here. See also Note A.

† "Creation by Law." G. A. R. Wallace. *Journal of Science*, October, 1867, p. 475.

‡ Mr. Wallace sees no difficulty whatever in making any supposition of this kind which the Theory may require. "Now let us start," he says, "from the time when the nectary was only half its present length, or about six inches, and was chiefly fertilized by a species of Moth *which appeared at the time of the plants flowering, and whose proboscis was of the same length.*"—Ibid. p. 475.

other. And then there is a larger question than any of these which remains behind. How came Orchids to be dependent at all upon insects for fertilization? It cannot be argued that this is a necessity arising mechanically from the nature of things, because, as we are truly told by an eminent naturalist who warmly supports the Darwinian hypothesis, "exactly the same end is attained in ten thousand other flowers" which do not possess the same structure.* But what is the bearing of this fact upon the theory? Is it not this—that the origin of such curious structures, and complicated relations, cannot be accounted for on any principle of mere mechanical necessity? Elementary forces may indeed always be detected, for they are always present. But the manner in which they are worked irresistibly suggests some directing power, having as one of its aims mere increase and variety in that ocean of enjoyment which constitutes the sum of Organic Life. Some idea of this kind, however unconsciously, however reluctantly conceded, lurks in every form of words in which the facts of science can be generalized to the mind. Thus we find Mr. Wallace himself saying, in the same paper in which he regrets the language of Mr. Darwin, that the conception he prefers is, that the "contrivances" referred to "are some of the results of those general laws which were *so co-ordinated* at the first introduction of Life upon the earth, as to result necessarily in the utmost possible development of *varied* forms." Eliminating the word "necessarily," which, if it has any meaning, does not apply, as we have seen, to the case of the Orchids, this language presents an intelligible idea. It satisfies the mind precisely in proportion as it brings into view, however distant, the attributes of Mind, and gives us a glimpse of "the reason why." The production of variety in beauty and in enjoyment is the purpose which those words suggest. In like proportion is Mr. Darwin's language the truest and the best. His explanations of the mechanical methods by which a wonderful Orchis has come to be are indeed, as he himself says, with great candor, "partial" and partial only. How different from the clearness and the certainty with which Mr. Darwin is able to explain to us the use and intention of the various organs! or the primal

* "Creation by Law," p. 474.

idea of numerical order and arrangement which governs the whole structure of the flower! It is the same through all Nature. Purpose and intention, or ideas of order based on numerical relations, are what meet us at every turn, and are more or less readily recognized by our own intelligence as corresponding to conceptions familiar to our own minds. We know, too, that these purposes and ideas are not our own, but the ideas and purposes of Another—of One whose manifestations are indeed superhuman and supermaterial, but are not "supernatural," in the sense of being strange to Nature, or in violation of it.

The truth is, that there is no such distinction between what we find in Nature, and what we are called upon to believe in Religion, as that which men pretend to draw between the Natural and the Supernatural. It is a distinction purely artificial, arbitrary, unreal. Nature presents to our intelligence, the more clearly the more we search her, the designs, ideas, and intentions of some

> "Living Will that shall endure,
> When all that seems shall suffer shock."

Religion presents to us that same Will, not only working equally through the use of means, but using means which are strictly analogous—referable to the same general principles—and which are constantly appealed to as of a sort which we ought to be able to appreciate, because we are already familiar with the like. Religion makes no call on us to reject that idea, which is the only idea some men can see in Nature—the idea of the universal Reign of Law—the necessity of conforming to it—the limitations which in one aspect it seems to place on the exercise of Will,—the essential basis, in another aspect, which it supplies for all the functions of Volition. On the contrary, the high regions into which this idea is found extending, and the matters over which it is found prevailing, is one of the deepest mysteries both of Religion and of Nature. We feel sometimes as if we should like to get above this rule—into some secret Presence where its bonds are broken. But no glimpse is ever given us of anything, but "Freedom within the bounds of Law." The Will revealed to us in Religion is not—any more than the Will re-

vealed to us in Nature—a capricious Will, but one with which, in this respect, "there is no variableness, neither shadow of turning."

We return, then, to the point from which we started. M. Guizot's affirmation that belief in the Supernatural is essential to all Religion is true only when it is understood in a special sense. Belief in the existence of a Living Will—of a Personal God—is indeed a requisite condition. Conviction "that He is" must precede the conviction that "He is the rewarder of those that diligently seek Him." But the intellectual yoke involved in the common idea of the Supernatural is a yoke which men impose upon themselves. Obscure thought and confused language are the main source of difficulty.

Assuredly, whatever may be the difficulties of Christianity, *this* is not one of them,—that it calls on us to believe in any exception to the universal prevalence and power of Law. Its leading facts and doctrines are directly connected with this belief, and directly suggestive of it. The Divine mission of Christ on earth—does not this imply not only the use of means to an end, but some inscrutable necessity that certain means, and these only, should be employed in resisting and overcoming evil? What else is the import of so many passages of Scripture implying that certain conditions were required to bring the Saviour of Man into a given relation with the race he was sent to save? "It behoved Him . . . . to make the Captain of our Salvation perfect through suffering." "It behoved Him in all things to be made like unto His brethren, *that he might be*," etc.—with the reason added: "for *in that* He Himself hath suffered being tempted, *He is able* to succour them that are tempted." Whatever *more* there may be in such passages, they all imply the universal reign of Law in the moral and spiritual, as well as in the material world: that those laws had to be—behoved to be—obeyed; and that the results to be obtained are brought about by the adaptation of means to an end, or, as it were, by way of natural consequences from the instrumentality employed. This, however, is an idea which systematic theology generally regards with intense suspicion, though, in fact, all theologies involve it, and build upon it. But then they are very apt to give explanations of that instrumentality which have no counterpart

in the material or in the moral world. Perhaps it is not too much to say that the manifest decay which so many creeds and confessions are now suffering, arises mainly from the degree in which at least the popular expositions of them dissociate the doctrines of Christianity from the analogy and course of Nature. There is no such severance in Scripture—no shyness of illustrating Divine things by reference to the Natural. On the contrary, we are perpetually reminded that the laws of the spiritual world are in the highest sense laws of Nature, whose obligation, operation, and effect are all in the constitution and course of things. Hence it is that so much was capable of being conveyed in the form of parable—the common actions and occurrences of daily life being often chosen as the best vehicle and illustration of the highest spiritual truths. It is not merely, as Jeremy Taylor says, that "all things are full of such resemblances,"—it is more than this—more than resemblance. It is the perpetual recurrence, under infinite varieties of application, of the same rules and principles of Divine government,—of the same Divine thoughts, Divine purposes, Divine affections. Hence it is that no verbal definitions or logical forms can convey religious truth with the fulness or accuracy which belongs to narratives taken from Nature—Man's nature and life being, of course, included in the term :

> "And so, the Word had breath, and wrought
> With human hands the Creed of creeds."
>
> "*In Memoriam*," TENNYSON.

The same idea is expressed in the passionate exclamation of Edward Irving :—"We must speak in parables, or we must present a wry and deceptive form of truth ; of which choice the first is to be preferred, and our Lord adopted it. Because parable is truth veiled, not truth dismembered ; and as the eye of the understanding grows more piercing, the veil is seen through, and the truth stands revealed." Nature is the great Parable ; and the truths which she holds within her are veiled, but not dismembered. The pretended separation between that which lies within Nature and that which lies beyond Nature is a dismemberment of the truth. Let both those who find it difficult to believe in anything which is "above" the Natural, and those

who insist on that belief, first determine how far the Natural extends. Perhaps in going round these marches they will find themselves meeting upon common ground. For indeed, long before we have searched out all that the Natural includes, there will remain little in the so-called Supernatural which can seem hard of acceptance or belief—nothing which is not rather essential to our understanding of this otherwise "unintelligible world."

CHAPTER II.

LAW;—ITS DEFINITIONS.

THE Reign of Law—is this, then, the reign under which we live? Yes, in a sense it is. There is no denying it. The whole world around us, and the whole world within us, are ruled by Law. Our very spirits are subject to it—those spirits which yet seem so spiritual, so subtle, so free. How often in the darkness do they feel the restraining walls—bounds within which they move—conditions out of which they cannot think! The perception of this is growing in the consciousness of men. It grows with the growth of knowledge; it is the delight, the reward, the goal of Science. From Science it passes into every domain of thought, and invades, amongst others, the Theology of the Church. And so we see the men of Theology coming out to parley with the men of Science,—a white flag in their hands, and saying, "If you will let us alone we will do the same by you. Keep to your own province, do not enter ours. The Reign of Law which you proclaim, we admit—outside these walls, but not within them:—let there be peace between us." But this will never do. There can be no such treaty dividing the domain of Truth. Every one Truth is connected with every other Truth in this great Universe of God. The connection may be one of infinite subtlety, and apparent distance—running, as it were, underground for a long way, but always asserting itself at last, somewhere, and at some time. No bargaining, no fencing off the ground—no form of process, will avail to bar this right of way. Blessed right, enforced by blessed power! Every truth, which is truth indeed, is charged with its own consequences, its own analogies, its own suggestions. These will not be kept outside any artificial boundary; they will range over the whole Field of Thought, nor is there any corner of it from which they can be warned away.

And therefore we must cast a sharp eye indeed on every form

of words which professes to represent a scientific truth. If it be really true in one department of thought, the chances are that it will have its bearing on every other. And if it be not true, but erroneous, its effect will be of a corresponding character; for there is a brotherhood of Error as close as the brotherhood of Truth. Therefore, to accept as a truth that which is not a truth, or to fail in distinguishing the sense in which a proposition may be true, from other senses in which it is not true, is an evil having consequences which are indeed incalculable. There are subjects on which one mistake of this kind will poison all the wells of truth, and affect with fatal error the whole circle of our thoughts.

It is against this danger that some men would erect a feeble barrier by defending the position, that Science and Religion may be, and ought to be, kept entirely separate;—that they belong to wholly different spheres of thought, and that the ideas which prevail in the one province have no relation to those which prevail in the other. This is a doctrine offering many temptations to many minds. It is grateful to scientific men who are afraid of being thought hostile to Religion. It is grateful to religious men who are afraid of being thought to be afraid of Science. To these, and to all who are troubled to reconcile what they have been taught to believe with what they have come to know, this doctrine affords a natural and convenient escape. There is but one objection to it—but that is the fatal objection —that it is not true. The spiritual world and the intellectual world are not separated after this fashion: and the notion that they are so separated does but encourage men to accept in each, ideas which will at last be found to be false in both. The truth is, that there is no branch of human inquiry, however purely physical, which is more than the word "branch" implies; none which is not connected through endless ramifications with every other,—and especially that which is the root and centre of them all. If He who formed the mind be one with Him who is the Orderer of all things concerning which that mind is occupied, there can be no end to the points of contact between our different conceptions of them, of Him, and of ourselves.

The instinct which impels us to seek for harmony in the truths of Science and the truths of Religion, is a higher instinct and a

truer one than the disposition which leads us to evade the difficulty by pretending that there is no relation between them. For, after all, it is a pretence and nothing more. No man who thoroughly accepts a principle in the philosophy of Nature which he feels to be inconsistent with a doctrine of Religion, can help having his belief in that doctrine shaken and undermined. We may believe, and we must believe, both in Nature and Religion, many things which we cannot understand; but we cannot really believe two propositions which are felt to be contradictory. It helps us nothing in such a difficulty, to say that the one proposition belongs to Reason and the other proposition belongs to Faith. The endeavor to reconcile them is a necessity of the mind. We are right in thinking that, if they are both indeed true, they can be reconciled, and if they really are fundamentally opposed, they cannot both be true. That is to say, there must be some error in our manner of conception in one or in the other, or in both. At the very best, each can represent only some partial and imperfect aspect of the truth. The error may lie in our Theology, or it may lie in what we are pleased to call our Science. It may be that some dogma, derived by tradition from our fathers, is having its hollowness betrayed by that light which sometimes shines upon the ways of God out of a better knowledge of His works. It may be that some proud and rash generalization of the schools is having its falsehood proved by the violence it does to the deepest instincts of our spiritual nature,—to

> "Truths which wake to perish never;
> Which neither man nor boy,
> Nor all that is at enmity with joy,
> Can utterly abolish or destroy."
>
> "*Ode to Immortality*," WORDSWORTH.

Such, for example, is the conclusion to which the language of some scientific men is evidently pointing, that great general Laws inexorable in their operation, and Causes in endless chain of invariable sequence, are the governing powers in Nature, and that they leave no room for any special direction or providential ordering of events. If this be true, it is vain to deny its bearing on Religion. What then can be the use of

prayer? Can Laws hear us? Can they change, or can they suspend themselves? These questions cannot but arise, and they require an answer. It is said of a late eminent Professor and clergyman of the English Church, who was deeply imbued with these opinions on the place occupied by Law in the economy of Nature, that he went on, nevertheless, preaching high doctrinal sermons from the pulpit until his death. He did so on the ground that propositions which were contrary to his reason were not necessarily beyond his faith. The inconsistencies of the human mind are indeed unfathomable: and there are men so constituted as honestly to suppose that they can divide themselves into two spiritual beings, one of whom is sceptical, and the other is believing. But such men are rare—happily for Religion, and not less happily for Science. No healthy intellect, no earnest spirit, can rest in such self-betrayal. Accordingly we find many men now facing the consequences to which they have given their intellectual assent, and taking their stand upon the ground that prayer to God has no other value or effect than so far as it may be a good way of preaching to ourselves. It is a useful and helpful exercise for our own spirits, but it is nothing more. But how can they pray who have come to this? Can it ever be useful or helpful to believe a lie? That which has been threatened as the worst of all spiritual evils, would then become the conscious attitude of our "religion," the habitual condition of our worship. This must be a bad science, as it is bad religion. It is in violation of a law the highest known to Man—the Law which inseparably connects earnest conviction of the truth in what we do or say, with the very fountains of all intellectual and moral strength. No accession of force can come to us from doing anything in which we disbelieve. Such a doctrine will be indeed

> "The little rift within the lute
> That by and by will make the music mute,
> And ever widening slowly silence all."
> "*Idyls of the King—Vivien*," TENNYSON.

If there is any helpfulness in Prayer even to the Mind itself, that helpfulness can only be preserved by showing that the

belief on which this virtue depends is a rational belief. The very essence of that belief is this—that the Divine Mind is accessible to supplication, and that the Divine Will is capable of being moved thereby. No question is, or indeed can be, raised as to the powerful effect exerted by this belief on Man's nature. That effect is recognized as a fact. Its value is admitted; and in order that it may not be lost, the compromise now offered by some philosophers is this—that although the course of external nature is unalterable, yet possibly the phenomena of Mind and character may be changed by the Divine Agency. But will this reasoning bear analysis? Can the distinction it assumes be maintained? Whatever difficulties there may be in reconciling the ideas of Law and of Volition, they are difficulties which apply equally to the Worlds of Matter and of Mind. The Mind is as much subject to Law as the Body is. The Reign of Law is over all; and if its dominion be really incompatible with the agency of Volition, Human or Divine, then the Mind is as inaccessible to that agency as material things. It would indeed be absurd to affirm that all Prayers are equally rational or equally legitimate. Most true it is that "we know not what we should pray for as we ought." Prayer does not require us to believe that anything can be done without the use of means; neither does it require us to believe that anything will be done in violation of the Universal Order. "If it be possible," was the qualification used in the most solemn Prayer ever uttered upon Earth. What are and what are not legitimate objects of supplication, is a question which may well be open. But the question now raised is a wider one than this—even the question whether the very idea of Prayer be not in itself absurd—whether the Reign of Law does not preclude the possibility of Will affecting the successive phenomena either of Matter or of Mind. This is a question lying at the root of our whole conceptions of the Universe, and of all our own powers, both of thinking and of acting. The freedom which is denied to God is not likely to be left to Man. We shall see, accordingly, that precisely the same denials are applied to both.

The conception of Natural Laws—of their place, of their nature, and of their office—which involves us in such questions,

and which points to such conclusions, demands surely a very careful examination at our hands.

What, then, is this Reign of Law? What is Law, and in what sense can it be said to reign?

Words, which should be the servants of Thought, are too often its masters; and there are very few words which are used more ambiguously, and therefore more injuriously, than the word "Law." It may indeed be legitimately used in several different senses, because in all cases as applied in Science it is a metaphor, and one which has relation to many different kinds and degrees of likeness in the ideas which are compared. It matters little in which of these senses it is used, provided the distinctions between them are kept clearly in view, and provided we watch against the fallacies which must arise when we pass insensibly from one meaning to another. And here it may be observed, in passing, that the metaphors which are employed in Language are generally founded on analogies instinctively, and often unconsciously, perceived, and which would not be so perceived if they were not both deep and true. In this case the idea which lies at the root of Law in all its applications is evident enough. In its primary signification, a "law" is the authoritative expression of human Will enforced by Power. The instincts of mankind finding utterance in their language, have not failed to see that the phenomena of Nature are only really conceivable to us as in like manner the expressions of a Will enforcing itself with Power. But, as in many other cases, the secondary or derivative senses of the word have supplanted the primary signification; and Law is now habitually used by men who deny the analogy on which that use is founded, and to the truth of which it is an abiding witness. It becomes therefore all the more necessary to define the secondary senses with precision. There are at least Five different senses in which Law is habitually used, and these must be carefully distinguished:—

First, We have Law as applied simply to an observed Order of facts.

Secondly, To that Order as involving the action of some Force or Forces of which nothing more may be known.

Thirdly, As applied to individual Forces the measure of whose operation has been more or less defined or ascertained.

Fourthly, As applied to those combinations of Force which have reference to the fulfilment of Purpose, or the discharge of Function.

Fifthly, As applied to Abstract Conceptions of the mind—not corresponding with any actual phenomena, but deduced therefrom as axioms of thought necessary to our understanding of them. Law, in this sense, is a reduction of the phenomena not merely to an Order of facts, but to an Order of Thought.

These great leading significations of the word Law all circle round the three great questions which Science asks of Nature, the What, the How, and the Why :—

(1) What are the facts in their established Order?

(2) How—that is, from what physical causes,—does that Order come to be?

(3) Why have these causes been so combined? What relation do they bear to Purpose, to the fulfilment of intention, to the discharge of Function?

It is so important that these different senses of the word Law should be clearly distinguished, that each of them must be more fully considered by itself.

The First and, so to speak, the lowest sense in which Law is applied to natural phenomena is that in which it is used to express simply "an observed Order of facts"—that is to say, facts which under the same conditions always follow each other in the same order. In this sense the laws of Nature are simply those facts of Nature which recur according to a rule. It is not necessary to the legitimate application of Law in this sense that the cause of any observed Order of facts should be at all known, or even guessed at. The Force or Forces to which that Order is due may be hid in total darkness. It is sufficient that the Order or sequence of phenomena be uniform and constant. The neatest and simplest illustration of this, as well as of the other senses in which Law is used, is to be found in the exact sciences, and especially in the history of Astronomy. It is nearly 250 years since Kepler discovered, in respect to the distances, velocities, and orbits of the Planets, three facts, or rather three series of facts, which, during many years * of in-

* The "Third Law" of Kepler was made known to the world in 1619. Newton's "Principia" appeared in 1687.

tense application to physical inquiry, remained the highest truths known to Man on the phenomena of the Solar System. They were known as the Three Laws of Kepler. It is not necessary to describe in detail here what these laws were. Suffice it to say, that the most remarkable among them were facts of constant numerical relation between the distances of the different Planets from the Sun, and the length of their periodic times; and again, between the velocity of their motion and the space enclosed within certain corresponding sections of their orbit. These Laws were simply and purely an "Order of facts" established by observation, and not connected with any known cause. The Force of which that Order is a necessary result had not then been ascertained. A very large proportion of the laws of every science are laws of this kind and in this sense. For example, in Chemistry the behavior of different substances towards each other, in respect to combination and affinity, is reduced to system under laws of this kind, and of this kind only. Because, although there is a probability that Electric or Galvanic Force is the cause or one of the causes of the series of facts exhibited in chemical phenomena, this is as yet no better than a probability, and the laws of Chemistry stand no higher than facts which by observation and experiment are found to follow certain rules.

But the ascertainment of a law in this First and lower sense leads immediately and instinctively to the search after Law in another sense which is higher. An observed Order of facts, to be entitled to the rank of a Law, must be an Order so constant and uniform as to indicate necessity, and necessity can only arise out of the action of some compelling Force. Law, therefore, comes to indicate not merely an observed Order of facts, but that Order as involving the action of some Force or Forces, of which nothing more may be known than these visible effects. Every observed Order in physical phenomena suggests irresistibly to the mind the operation of some physical cause. We say of an observed Order of facts that it must be due to some "law," meaning simply that all Order involves the idea of some arranging cause, the working of some Force or Forces (whether they be such as we can further trace and de-

fine or not) of which that Order is the index and the result. This is the Second of the five senses specified above.

And so we pass on, by an easy and natural transition, to the Third sense in which the word Law is used. This is the most exact and definite of all. The mere general idea that some Force is at the bottom of all phenomena, which are invariably consecutive, is a very different thing from knowing what that Force is in respect to the rule or measure of its operation. Of Law in this sense the one great example, before and above all others, is the Law of Gravitation, for this is a Law in the sense not merely of a rule, but of a cause—that is, of a Force accurately defined and ascertained according to the measure of its operation, from which Force other phenomena arise by way of necessary consequence. Force is the root-idea of Law in its scientific sense. And so the Law of Gravitation is not merely the "observed order" in which the heavenly bodies move; neither is it only the abstract idea of some Force to which such movements must be due, but it is that Force the exact measure of whose operation was numerically ascertained or defined by Newton—the Force which compels those movements and (in a sense) explains them. Now the difference between Law in the narrower and Law in the larger sense cannot be better illustrated than in the difference between the Three special Laws discovered by Kepler, and the One universal Law discovered by Newton. The Three Laws of Kepler were, as we have seen, simply and purely an observed Order of facts. They stood by themselves—disconnected,—their cause unknown. The higher Law, discovered by Newton, revealed their connection and their cause. The "observed Order" which Kepler had discovered, was simply a necessary consequence of the Force of Gravitation. In the light of this great Law the "Three Laws of Kepler" have been merged and lost.

When the operations of any material Force can be reduced to rules so definite as those which have been discovered in respect to the Force of Gravitation, and when these rules are capable of mathematical expression and of mathematical proof, they are, so far as they go, in the nature of pure truth. Mr. Lewes, in his very curious and interesting work on the "Philosophy of Aristotle," has maintained that the knowledge of Meas-

ure—or what he calls the "verifiable element" in our knowledge—is the element which determines whether any theory belongs to Science, strictly so called, or to Metaphysics; and that any theory may be transferred from Metaphysics to Science, or from Science to Metaphysics, simply by the addition or withdrawal of its "verifiable element." In illustration of this, he says that if we withdraw, from the Law of Universal Attraction, the formula, "inversely as the square of the distance, and directly as the mass," it becomes pure Metaphysics. If this means that, apart from ascertained numerical relations, our conception of Law, or our knowledge of natural phenomena, loses all reality and distinctness, I do not agree in the position. The idea of natural Forces is quite separate from any ascertained measure of their energy. The knowledge, for example, that all the particles of matter exert an attractive force upon each other, is, so far as it goes, true physical knowledge, even though we did not know the further truth, that this force acts according to the numerical rule ascertained by Newton. To banish from physical Science, properly so called, and to relegate to Metaphysics, all knowledge which cannot be reduced to numerical expression, is a dangerous abuse of language.

Force, ascertained according to some measure of its operation—this is indeed one of the definitions, but only one, of a scientific Law. The discovery of laws in this sense is the great quest of Science, and the finding of them is one of her great rewards. Such laws yield to the human mind a peculiar delight, from the satisfaction they afford to those special faculties whose function it is to recognize the beauty of numerical relations. This satisfaction is so great, and in its own measure is so complete, that the mind reposes on an ascertained law of this kind as on an ultimate truth. And ultimate it is as regards the particular faculties which are concerned in this kind of search. When we have observed our facts, and when we have summed up our figures, when we have recognized the constant numbers,—then our eyes, our ears, and our calculating faculties have done their work. But other faculties are called into simultaneous operation, and these have other work to do. For let it be observed that laws in the first three senses we have now examined, cannot be said to explain anything ex-

cept the Order of subordinate phenomena. They set forth that order as due to Force. They do nothing more. Least of all do laws, in any of these three senses, explain themselves. They suggest a thousand questions much more curious than the questions which they solve. The very beauty and simplicity of some laws is their deepest mystery. What can their source be? How is their uniformity maintained? Every law implies a Force, and all that we ever know is some numerical rule or measure according to which some unknown Forces operate. But whence come those measures—those exact relations to number, which never vary? Or, if there are variations, how comes it that these are always found to follow some other rules as exact and as invariable as the first?

And as there can be no better example of what Law is, so also there can be no better example of what it is not—than the Law of Gravitation. The discovery of it was probably the highest exercise of pure intellect through which the human mind has found its way. It is the most universal physical law which is known to us, for it prevails, apparently, through all space. Yet of the Force of Gravitation all we know is that it is a force of attraction operating between all the particles of matter in the exact measure which was ascertained by Newton,—that is—"directly as the mass, and inversely as the square of the distance." This is the Law. But it affords no sort of explanation of itself. What is the cause of this Force—what is its source—what are the media of its operation—how is the exact uniformity of its proportions maintained?—these are questions which it is impossible not to ask, but which it is quite as impossible to answer. Sir John Herschel, in speaking of this Force, has indicated in a passing sentence a few questions out of the many which arise:—"No matter," he says, "from what ultimate causes the power called gravitation originates—be it a virtue lodged in the sun as its receptacle, or be it pressure from without, or the resultant of many pressures, or solicitations of unknown kinds, magnetic or electric, ethers or impulses," * etc., etc. How little we have ascertained in this Law, after all! Yet there is an immense and an instinctive pleasure in the contemplation of it. To analyze this pleasure is as difficult as to ana-

* Herschel's "Outlines of Astronomy," fifth edition, p. 323.

lyze the pleasure which the eye takes in beauty of form, or the pleasure which the ear takes in the harmonies of sound. And this pleasure is inexhaustible, for these laws of number and proportion pervade all Nature, and the intellectual organs which have been fitted to the knowledge of them have eyes which are never satisfied with seeing, and ears which are never full of hearing. The agitation which overpowered Sir Isaac Newton as the Law of Gravitation was rising to his view in the light of rigorous demonstration, was the homage rendered by the great faculties of his nature to a harmony which was as new as it was immense and wonderful. The same pleasure in its own degree is felt by every man of science who, in any branch of physical inquiry, traces and detects any lesser law. And it is perfectly true that such laws are being detected everywhere. Forces which are in their essence and their source utterly mysterious, are always being found to operate under rules which have strict reference to measures of number,—to relations of Space and Time. The Forces which determine chemical combination all work under rules as sharp and definite as the Force of Gravitation. So do the Forces which operate in Light, and Heat, and Sound. So do those which exert their energies in Magnetism and Electricity. All the operations of Nature—the smallest and the greatest—are performed under similar measures and restraints. Not even a drop of water can be formed except under rules which determine its weight, its volume, and its shape, with exact reference to the density of the fluid, to the structure of the surface on which it may be formed, and to the pressure of the surrounding atmosphere. Then that pressure is itself exercised under rigorous rules again. Not one of the countless varieties of form which prevail in clouds, and which give to the face of heaven such infinite expression, not one of them but is ruled by Law,—woven, or braided, or torn, or scattered, or gathered up again and folded,—by Forces which are free only "within the bounds of Law."

And equally in those subjects of inquiry in which rules of number and of proportion are not applicable, rules are discernible which belong to another class, but which are as certain and as prevailing. All events, however casual or disconnected they may at first appear to be, are found in the course of time

to arrange themselves in some certain Order, the index and exponent of Forces, of which we know nothing except their existence as evidenced in these effects. It is indeed wonderful to find that in such a matter, for example, as the development of our Human Speech, the unconscious changes which arise from time to time among the rudest utterances of the rudest tribes and races of Mankind, are all found to follow rules of progress as regular as those which preside over any of the material growths of Nature. Yet so it is; and it is upon this fact alone that the science of Language rests—a science in which all the facts are not yet observed, and many of those which have been observed are not yet reduced to order; but in which enough has been ascertained to show that languages grow, and change from generation to generation, according to rules of which the men who speak them are wholly unconscious. It is the same with all other things. And as it is now, so apparently has it been in all past time of which we have any record. Even the work of Creation has been and is being carried on under rules of adherence to Typical Forms, and under limits of variation from them, which can be dimly seen and traced, although they cannot be defined or understood. The universal prevalence of laws of this kind cannot therefore be denied. The discovery of them is one of the first results of all physical inquiry. In this sense it is true that we, and the world around us, are under the Reign of Law.

It is true, but only a bit and fragment of the truth. For there is another fact quite as prominent as the universal presence and prevalence of laws—and that is, the number of them which are concerned in each single operation in Nature. No one Law—that is to say, no one Force—determines anything that we see happening or done around us. It is always the result of different and opposing Forces nicely balanced against each other. The least disturbance of the proportion in which any one of them is allowed to tell, produces a total change in the effect. The more we know of Nature, the more intricate do such combinations appear to be. They can be traced very near to the fountains of Life itself, even close up to the confines of the last secret of all—how the Will acts upon its organs in

the Body. Recent investigations in Physiology seem to favor the hypothesis that our muscles are the seat of two opposing Forces, each so adjusted as to counteract the other; and that this antagonism is itself so arranged as to enable us by acting on one of these Forces, to regulate the action of the other. One Force—an elastic or contractile Force—is supposed to be inherent in the muscular fibre · another Force—that of Animal Electricity in statical condition—holds the contractile Force in check; and the relaxed, or rather the restful, condition of the muscle when not in use, is due to the balance so maintained. When, through the motor nerves the Will orders the muscles into action, that order is enforced by a discharge of the Electrical Force, and upon this discharge the contractile Force is set free to act, and does accordingly produce the contraction which is desired.*

Such is, at least, one suggestion as to the means employed to place human action under the control of human Will, in that material frame which is so wonderfully and fearfully made. And whether this hypothesis be accurate or not, it is certain that some such adjustment of Force to Mechanism is involved in every bodily movement which is subject to the Will. Even in this high region, therefore, we see that the existence of individual laws is not the end of our physical knowledge. What we always reach at last in the course of every physical inquiry, is the recognition, not of individual laws, but of some definite relation to each other, in which different laws are placed, so as to bring about a particular result. But this is, in other words, the principle of Adjustment, and adjustment has no meaning except as the instrument and the result of Purpose. Force so combined with Force as to produce certain definite and orderly results,—this is the ultimate fact of all discovery.

And so we come upon another sense—the Fourth sense, in which Law is habitually used in Science, and this is perhaps the commonest and most important of all. It is used to designate not merely an observed Order of facts—not merely the bare abstract idea of Force—not merely individual Forces according to ascertained measures of operation—but a number

* This theory of muscular and nervous action is set forth with much ingenuity and force of illustration in "Lectures on Epilepsy," etc., by Charles Bland Radcliffe, M.D.

of Forces in the condition of mutual adjustment, that is to say, as combined with each other, and fitted to each other for the attainment of special ends. The whole science of Animal Mechanics, for example, deals with Law in this sense—with natural Forces as related to Purpose and subservient to the discharge of Function. And this is the highest sense of all—Law in this sense being more perfectly intelligible to us than in any other ; because, although we know nothing of the real nature of Force, even of that Force which is resident in ourselves, we do know for what ends we exert it, and the principle that governs our devices for its use. That principle is, Combination for the accomplishment of Purpose.

Accordingly it is, when natural phenomena can be reduced to Law, in this last sense, that we reach something which alone is really in the nature of an explanation. For what do we mean by an explanation? It is an unfolding or a "making plain." But as the human mind has many faculties, so each of these seeks a satisfaction of its own. That which is made plain to one faculty is not necessarily made plain to another. That which is a complete answer to the question What, or to the question How, is no answer at all to the question Why. There are some philosophers who tell us that this last is a question which had better never be asked, because it is one to which Nature gives no reply. If this be so, it is strange that Nature should have given us the faculties which impel us to ask this question—ay, and to ask it more eagerly than any other. It is, indeed, true that there is a point beyond which we need not ask it, because the answer is inaccessible. But this is equally true of the questions What, and How. We cannot reach Final Causes any more than Final Purposes. For every cause which we can detect, there is another cause which lies behind; and for every purpose which we can see, there are other purposes which lie beyond.

And so it is true that all things in Nature may either be regarded as means or as ends—for they are always both—only that Final Ends we can never see. For, as Bishop Butler truly says in his "Analogy," Chapter IV., "We know what we ourselves aim at as final ends, and what courses we take merely as means conducing to these ends. But we are greatly igno-

rant how far things are considered by the Author of Nature under the simple notion of means and ends,—so as that it may be said this is merely an end, and that merely means, in His regard. And whether there be not some peculiar absurdity in our very manner of conception concerning this matter, somewhat contradictory, arising from an extremely imperfect view of things, it is impossible to say." This is indeed a wise caution, and one which has been much needed to check the abuse of that method of reasoning which has been called the doctrine of Final Causes. When Man makes an implement, he knows the purpose for which he makes it—he knows the function assigned to it in his own intention. But as in making it there are a thousand chips and fragments of material which he casts aside, so in its final use it often produces consequences and results which he did not contemplate or foresee. But in Nature all this is different. Nature has no chips or fragments which she does not put to use; and as on the way to her apparent ends there are no incidents which she did not foresee, so beyond those ends there are no ulterior results which do not open out into new firmaments of Design. Of nothing, therefore, can we say with even the probability of truth that we see its Final Cause; that is to say, its ultimate purpose. All that we can ever see are the facts of Adjustment and of Function, and these constitute not Final, but Immediate Purpose. But a purpose is not less a purpose, because other purposes may lie beyond it. And not only can we detect Purpose in natural phenomena, but, as we have already seen, it is very often the only thing about them which is intelligible to us. The How is very often incomprehensible, where the Why is apparent at a glance. And be this observed, that when Purpose is perceived, it is a "making plain" to a higher faculty of the mind than the mere sense of Order. It is a making plain to Reason. It is the reduction of phenomena to that Order of Thought which is the basis of all other Order in the works of Man, and which, he instinctively concludes, is the basis also of all Order in the works of Nature.

And here it is important to observe, that although this general conclusion, like all other general conclusions, belongs to the category of mental inferences. and not to the category of

physical facts, yet each particular instance of Purpose on which the general inference is founded, is not an inference merely, but a fact. The function of an organ, for example, is a matter of purely physical investigation. But the function of an organ is not merely that which it does, but it is that which some special construction enables it to do. It is, not merely its work, but it is the work assigned to it as an Apparatus, and as fitted to other organs having other functions related to its own. The nature of that Apparatus, as being in itself an adjustment for a particular purpose, is not an inference from the facts, but it is part of the facts themselves. The very idea of Function is inseparable from the idea of Purpose. The Function of an organ is its Purpose; and the relation of its parts, and of the whole to that Purpose, is as much and as definitely a scientific fact as the relation of any other phenomenon to Space, or Time, or Number.

This distinction between Purpose as a general inference and Purpose as a particular fact, has not been sufficiently observed. The just condemnation pronounced by Bacon on the pursuit of Final Causes as distorting the true Method of Physical Investigation, has been applied without discrimination to two very different conceptions. Even Philosophers who believe in the Supremacy of Purpose in Nature have been willing to banish this conception from the Domain of Science, and to classify it as belonging altogether to Metaphysics or Theology. Thus in the very able Harveian Oration for 1865 by Dr. H. W. Acland, he says,—"Whether there be any Purpose, is the object of Theological and Metaphysical, but not of Physical inquiry." * And again, "The evidence of intention is metaphysical, and depends on probabilities. It is not positive. It is inferential from many considerations." † I venture to dissent from these conclusions. They involve, I think, a confounding of two separate questions. The nature and character of the intending Mind—this is indeed a question of Theology; but not the existence of intention. Neither in any restrictive sense of the word can it be called Metaphysical. Even as a general doctrine, the doctrine of Contrivance and Adjustment is not so metaphysical as the Doctrine of Homologies; and when we come to particular

* P. 61.

cases there can be no question whatever that the relation of a given Structure to its Purpose and Function comes more unequivocally under the class of physical facts than the relation of that same Structure to some corresponding part in another animal. It is less ideal, for example,—less theoretical—less metaphysical—to assert of the little hooked claw which is attached to the (apparent) elbow of a Bat's wing, that it was placed there to enable the Bat to climb and crawl, than to affirm of that same claw that it is the "homologue" of the human thumb. Yet who can deny that this doctrine of Homologies has been established as a strictly scientific truth? There is a sense, of course, in which all Knowledge and all Science belongs to Metaphysics. Mere classification, which is the basis of all Science, what is it but the marshalling of physical facts in an Ideal Order—an arrangement of them according to the relation which they bear to the laws of Thought? But this does not constitute as a branch of Metaphysics, the division of animals into Genera, and Families, and Orders. And what relation can physical facts ever have to Thought so directly cognizable or so susceptible of Demonstration as the relation of an animal organ to its purpose and function in the animal economy? Whether Purpose be the basis of all natural Order or not is a separate question. It is at least one of the facts of that Order. Combination for the accomplishment of Purpose therefore in particular cases, such as the relation between the structure of an Organ and its function, is not merely a safe conclusion of Philosophy, but an ascertained fact of Science. (See note B.)

This question has acquired additional importance since the revival in our own day, and with new resources, of that old philosophy which assumes to banish from the domain of Knowledge no small part of the richest and surest acquisitions of Reason. That Philosophy must be tested by a rigid analysis of thought and language. This is the weapon with which the assault is made, and it is by the same weapon better handled that it can alone be met. An arbitrary limitation of the word "knowledge," to a particular kind of knowledge, can only be tolerated on condition that the arbitrary nature of the limitation be constantly kept in view. In like manner the word "verification"

may be confined to a particular kind of proof applicable only to a particular class of truths. So again, in regard to "Metaphysics," it may be considered with reference to its subject-matter as denoting a particular branch of inquiry—such as Psychology—or as a method of investigation which may be applied equally to all subjects which furnish the mind with the materials of thought. But we must watch against the substitution of one of these meanings for another; and against the jugglery by which men first use Metaphysical Analysis to pull down conceptions which they dislike, and then denounce Metaphysics as incapable of establishing any conclusions on which we can rely. The fact to which I have previously referred,* is a fact of immense significance, that one of the most able supporters of the Positive Philosophy in England relegates to Metaphysics the great scientific fact of Physical Attraction, when it is considered apart from its numerical relations. But if this be considered Metaphysics, then let it be remembered that many of the most certain truths we know belong to the same category. From a similar point of view, it might be argued, and it has actually been argued, that Number and all numerical relations are purely abstract conceptions of the mind, having no other reality than as there conceived. (See note C.) The same reasoning may be applied to all our most fundamental conceptions —without which Science could not even begin her work. The existence of Force under any form, of which the existence of Matter is only a special case, may be regarded as a purely metaphysical conception. It is surely a comfort to find that, if all ideas of Plan and of Design in the Adjustments of Organic Life are to be condemned as Metaphysical, they stand at least in goodly company among the necessities of Thought. Mr. Lewes, indeed, himself confesses that "Science finds it indispensable to co-ordinate all the facts in a general concept, such as a Plan." † But he pronounces it one of the "Infirmities of Thought" to "realize the concept." But no accurate thinker ever "realized" such an idea as a "Plan"—that is to say, no one ever conceived it as existing by itself, separate from an intending Mind. Mr. Lewes complains that "Matter and Force are

* P. 42.

† "History of Philosophy," Prologue, p. lxxxvi.

mysterious enough" without a "new mystery of Architectural Plan, shaping Matter and directing Force." * But, substituting here "Mind" for Plan, it may surely be argued that if Science finds it "indispensable" to co-ordinate all the facts in some such general concept, this is of itself a proof that the element so introduced does not add to the mystery, but helps to remove it. Even if it be an "artifice of thought," it can only be resorted to as rendering the facts not less but more conceivable. And this it plainly does by appealing to an agency having known power in the production of analogous phenomena. The instinctive wisdom which lies in this "infirmity" of the mind becomes more apparent when we turn to the efforts of an acute intellect to cast such infirmities away. The most abstract metaphysical conceptions are substituted for those which are denounced: the only difference being that, whilst the old conceptions are intelligible as connecting the Phenomena by a link of thought which the mind can feel and follow, the new conceptions are unintelligible because they try to describe facts without any reference to the ideas they involve. No new light—nothing but denser darkness—is cast on the phenomena of Organic Life by calling "Life the connexus of the organic activities." † Yet meaningless words are heaped on each other in the desperate effort to dispense with those conceptions which can alone render the order of Nature intelligible to us. Thus we are told again, that "The Organism is the synthesis of diverse parts, and Life is the synthesis of their properties;" ‡—and again, that "Vitality is the abstract designation of certain special properties manifested by Matter under certain special conditions." § Surely there is more light in the old reading:—"Finding," says Mr. Lewes, "in an organism a certain adjustment of parts, which may be reduced to a plan, we are *easily led to conceive* that this plan was made before the parts, and that the adjustment was determined by the plan." No doubt! This is the easiest conception, and it is the easiest because it is most conformable to the laws of Thought; and that which is the most conformable to the laws of Thought is that which makes the nearest approach to absolute Truth attainable by the Mind.

* "History of Philosophy," p. lxxxvi.
† Ibid. p. lxxx. ‡ Ibid. p. lxxxiii. § Ibid. p. lxxxiv.

The universal prevalence of this idea of Purpose in Nature is indicated by the irresistible tendency which we observe in the language of Science to personify the Forces, and the combinations of Force by which all natural phenomena are produced. It is a great injustice to scientific men—too often committed—to suspect them of unwillingness to accept the idea of a Personal Creator merely because they try to keep separate the language of Science from the language of Theology.* But it is curious to observe how this endeavor constantly breaks down—how impossible it is in describing physical phenomena to avoid the phraseology which identifies them with the phenomena of Mind, and is moulded on our own conscious Personality and Will. It is impossible to avoid this language simply because no other language conveys the impression which innumerable structures leave upon the mind. Take, for example, the word "contrivance." How could Science do without it? How could the great subject of Animal Mechanics be dealt with scientifically without continual reference to Law as that by which, and through which, special organs are formed for the doing of special work? What is the very definition of a machine? Machines do not increase Force, they only adjust it. The very idea and essence of a machine is that it is a contrivance for the distribution of Force with a view to its bearing on special purposes. A man's arm is a machine in which the law of leverage is supplied to the vital force for the purposes of prehension. We shall see presently that a bird's wing is a machine in which the same law is applied, under the most complicated conditions, for the purpose of flight. Anatomy supplies

* A remarkable instance of this injustice has been lately brought to light. Professor Huxley, in an article in the *Fortnightly Review*, had used one of those vague phrases, so common with scientific men, about the "unknown and the unknowable" being the goal of all scientific thought, which not unnaturally suggest the notion that all idea of a God is unattainable. A writer in the *Spectator* accordingly dealt with Professor Huxley as avowing Atheism, and was rebuked by the Professor in a letter published in the *Spectator* of Feb. 10, 1866. Professor Huxley says: "I do not know that I care very much about popular odium, so that there is no great merit in saying that if I really saw fit to deny the existence of a God, I should certainly do so, for the sake of my own intellectual freedom, and be the honest Atheist you are pleased to say I am. As it happens, however, I cannot take this position with honesty, inasmuch as it is, and always has been, a favorite tenet of mine, that Atheism is as absurd, logically speaking, as Polytheism." On the subject of miracles, in the same letter, Professor Huxley says, that "denying the possibility of miracles seems to me quite as unjustifiable as speculative Atheism." The question of miracles seems now to be admitted on all hands to be simply a question of evidence

an infinite number of similar examples. It is impossible to describe or explain the facts we meet with in this or in any other branch of Science without investing the "laws" of Nature with something of that Personality which they do actually reflect, or without conceiving of them as partaking of those attributes of Mind which we everywhere recognize in their working and results.

We may, again, take the Forces which determine the Planetary motions as the grandest and the simplest illustrations of this truth of Science. Gravitation, as already said, is a Force which prevails apparently through all space. But it does not prevail alone. It is a Force whose function it is to balance other Forces, of which we know nothing, except this,—that these, again, are needed to balance the Force of Gravitation. Each Force, if left to itself, would be destructive of the Universe. Were it not for the Force of Gravitation, the centrifugal Forces which impel the Planets would fling them off into Space. Were it not for these centrifugal Forces, the Force of Gravitation would dash them against the Sun. The orbits, therefore, of the Planets, with all that depends upon them, are determined by the nice and perfect balance which is maintained between these two Forces; and the ultimate fact of astronomical science is not the Law of Gravitation, but the Adjustment between this law and others which are less known, so as to produce and maintain the existing Solar System.

This is one example of the principle of Adjustment; but no one example, however grand the scale may be on which it is exhibited, can give any idea of the extent to which the principle of Adjustment is required, and is adopted in the works of Nature. The revolution of the seasons, for example—seed-time and harvest—depend on the Law of Gravitation in this sense, that if that law were disturbed, or if it were inconstant, they would be disturbed and inconstant also. But the seasons equally depend on a multitude of other laws,—laws of heat, laws of light, laws relating to fluids, and to solids, and to gases, and to magnetic attractions and repulsions, each one of which laws is invariable in itself, but each of which would produce utter confusion if it were allowed to operate alone, or if it were not balanced against others in the right proportion. It is very

difficult to form any adequate idea of the vast number of laws which are concerned in producing the most ordinary operations of Nature. Looking only at the combinations with which Astronomy is concerned, the adjustments are almost infinite. Each minutest circumstance in the position, or size, or shape of the Earth, the direction of its axis, the velocity of its motion and of its rotation, has its own definite effect, and the slightest change in any one of these relations would wholly alter the world we live in. And then it is to be remembered that the seasons, as they are now fitted to us, and as we are fitted to them, do not depend only on the facts or the laws which Astronomy reveals. They depend quite as much on other sets of facts, and other sets of laws, revealed by other sciences,—such, for example, as Chemistry, Electricity, and Geology. The motion of the Earth might be exactly what it is, every fact in respect to our Planetary position might remain unchanged, yet the seasons would return in vain if our own atmosphere were altered in any one of the elements of its composition, or if any one of the laws regulating the action were other than it is. Under a thinner air even the torrid zone might be wrapped in eternal snow. Under a denser air, and one with different refracting powers, the Earth and all that is therein might be burnt up. And so it is through the whole of Nature: laws everywhere—laws in themselves invariable, but so worked as to produce effects of inexhaustible variety by being pitched against each other, and made to hold each other in restraint.

I have already referred to Chemistry as a science full of illustrations of Law in the First and simplest sense—that is, of facts in observed orders of recurrence. But Chemistry is a science not less rich in illustration of Law in the Fourth sense —that is, of Forces in mutual adjustment. Indeed, in Chemistry, this system of adjustment among the different properties of matter is especially intricate and observable. Some of the laws which regulate Chemical Combination were discovered in our own time, and are amongst the most wonderful and the most beautiful which have been revealed by any science. They are laws of great exactness, having invariable relations to number and proportion. Each elementary substance has its own combining proportions with other elements, so that, except

in these proportions, no chemical union can take place at all. And when chemical union does take place, the compounds which result have different and even opposite powers according to the different proportions employed. Then, the relations in which those inorganic compounds stand to the chemistry of Life, constitute another vast series in which the principle of adjustment has applications, infinite in number, and as infinite in beauty. How delicate these relations are, and how tremendous are the issues depending on their management, may be conceived from this single fact,—that the same elements combined in one proportion are sometimes a nutritious food or a grateful stimulant, soothing and sustaining the powers of life; whilst, combined in another proportion, they may be a deadly poison, paralyzing the heart and carrying agony along every nerve and fibre of the animal frame. This is no mere theoretical possibility. It is actually the relation, for example, in which two well-known substances stand to each other—Tea and Strychnia. The active principles of these two substances, "Theine" and "Strychnine," are identical so far as their elements are concerned, and differ from each other only in the proportions in which they are combined. Such is the power of numbers in the Laboratory of Nature! What havoc in this world, so full of Life, would be made by blind chance gambling with such powers as these! What confusion, unless they were governed by laws whose certainty makes them capable of fine adjustment, and therefore subject to accurate control! How fine these adjustments are, and how absolute is that control, is indicated in another fact—and that is the few elements out of which all things are made. The number of substances deemed elementary has varied with the advance of Science; but as compared with the variety of their products, that number may be considered as infinitesimally small; whilst the progress of analysis, with glimpses of laws as yet unknown, renders it almost certain that this number will be found to be smaller still. Yet out of that small number of elementary substances, having fixed rules, too, limiting their combination, all the infinite varieties of organic and inorganic matter are built up by means of nice adjustment. As all the faculties of a powerful mind can utter their voice in language whose elements are

reducible to twenty-four letters, so all the forms of Nature, with all the ideas they express, are worked out from a few simple elements having a few simple properties.

Simple! can we call them so? Yes, simple by comparison with the exceeding complication of the uses they are made to serve: simple also, in this sense, that they follow some simple rule of numbers. But in themselves these laws, these forces are incomprehensible. That which is most remarkable about them is their unchangeableness. The whole mind and imagination of scientific men is often so impressed with this character of material laws, that no room is left for the perception of other aspects of their nature and of their work. We hear of rigid and universal sequence—necessary—invariable;—of unbroken chains of cause and effect, no link of which can, in the nature of things, be ever broken. And this idea grows upon the mind, until in some confused manner it is held as casting out the idea of Purpose in creation, and inconsistent with the element of Will. If it be so, the difficulty cannot be evaded by denying the uniformity, any more than the universality, of Law. It is perfectly true that every law is, in its own nature, invariable, producing always precisely and necessarily the same effects,—that is, provided it is worked under the same conditions. But then, if the conditions are not the same, the invariableness of effect gives place to capacities of change which are almost infinite. It is by altering the conditions under which any given law is brought to bear, and by bringing other laws to operate upon the same subject, that our own Wills exercise a large and increasing power over the material world. And be it observed—to this end the uniformity of laws is no impediment, but, on the contrary, it is an indispensable condition. Laws are in themselves—if not unchangeable—at least unchanging, and if they were not unchanging, they could not be used as the instruments of Will. If they were less rigorous they would be less certain, and the least uncertainty would render them incapable of any service. No adjustment, however nice, could secure its purpose if the implements employed were of uncertain temper.

The notion therefore that the uniformity or invariableness of the Laws of Nature cannot be reconciled with their subordina-

tion to the exercise of Will, is a notion contrary to our own experience. It is a confusion of thought arising very much out of the ambiguity of language. For let it be observed that, of all the senses in which the word Law is used, there is only one in which it is true that laws are immutable or invariable, and that is the sense in which Law is used to designate an individual Force. Gravitation, for example, is immutable in this respect—that (so far as we know) it never operates according to any other measure than "directly as the mass, and inversely as the square of the distance." But in all the other senses in which the word Law is used, laws are not immutable, but, on the contrary, they are the great instruments, the unceasing agencies, of change. When, therefore, scientific men speak, as they often do, of all phenomena being governed by invariable laws, they use language which is ambiguous, and in most cases they use it in a sense which covers an erroneous idea of the facts. There are no phenomena visible to Man of which it is true to say that they are governed by any invariable Force. That which does govern them is always some variable combinations of invariable forces. But this makes all the difference in reasoning on the relation of Will to Law,—this is the one essential distinction to be admitted and observed. There is no observed Order of facts which is not due to a combination of Forces; and there is no combination of Forces which is invariable—none which are not capable of change in infinite degrees. In these senses—and these are the common senses in which Law is used to express the phenomena of Nature—Law is not rigid, it is not immutable, it is not invariable, but it is, on the contrary, pliable, subtle, various. In the only sense in which laws are immutable, this immutability is the very characteristic which makes them subject to guidance through endless cycles of design. We know this in our own case. It is the very certainty and invariableness of the laws of Nature which alone enables us to use them, and to yoke them to our service.

Now, the laws of Nature appear to be employed in the system of Nature in a manner precisely analogous to that in which we ourselves employ them. The difficulties and obstructions which are presented by one law in the way of accomplishing a given purpose, are met and overcome exactly on the same

principle on which they are met and overcome Man—viz., by knowledge of other laws, and by resource in applying them, —that is, by ingenuity in mechanical contrivance. It cannot be too much insisted on, that this is a conclusion of pure Science. The relation which an organic structure bears to its purpose in Nature can be recognized as certainly as the same relation between a machine and its purpose in human art. It is absurd to maintain, for example, that the purpose of the cellular arrangement of material in combining lightness with strength, is a purpose legitimately cognizable by Science in the Menai Bridge, but is not as legitimately cognizable when it is seen in Nature, actually serving the same use. The little Barnacles which crust the rocks at low tide, and which to live there at all must be able to resist the surf, have the building of their shells constructed strictly with reference to this necessity. It is a structure all hollowed and chambered on the plan which engineers have so lately discovered as an arrangement of material by which the power of resisting strain or pressure is multiplied in an extraordinary degree. That shell is as pure a bit of mechanics as the bridge, both being structures in which the same arrangement is adapted to the same end.

> "Small, but a work divine;
> Frail, but of force to withstand,
> Year upon year, the shock
> Of cataract seas that snap
> The three-decker's oaken spine."
>
> "*Maud*," TENNYSON.

This is but one instance out of a number which no man can count. So far as we know, no Law—that is, no elementary Force—of Nature is liable to change. But every Law of Nature is liable to counteraction; and the rule is, that laws are habitually made to counteract each other in precisely the manner and degree which some definite result requires.

Nor is it less remarkable that the converse of this is true: no Purpose is ever obtained in Nature, except by the enlistment of Laws as the means and instruments of attainment. When an extraordinary result is aimed at, it often happens that some common law is yoked to extraordinary conditions,

and its action is intensified by some special machinery. For example, the Forces of Electricity are in action, probably, in all living Organisms, but certainly in the muscular and nervous system of the higher animals. In a very few (so far as yet known, in only a very few animals among the millions which exist, and these all belonging to the Class of Fishes), the electrical action has been so stored and concentrated as to render it serviceable as a weapon of offence. Creatures which grovel at the bottom of the sea, or in the slime of rivers, have been gifted with the astonishing faculty of wielding at their will the most subtle of all the powers of Nature. They have the faculty of "shooting out lightning" against their enemies or their prey. But this gift has not been given without an exact fulfilment of all the laws which govern Electricity, and which especially govern its concentration and destructive force. The Electric Ray, or Torpedo, has been provided with a Battery closely resembling, but greatly exceeding in the beauty and compactness of its structure, the Batteries whereby Man has now learned to make the laws of Electricity subservient to his will. There are no less than 940 hexagonal columns in this Battery like those of a bee's comb, and each of these is subdivided by a series of horizontal plates, which appear to be analogous to the plates of the Voltaic Pile. The whole is supplied with an enormous amount of nervous matter, four great branches of which are as large as the animal's spinal cord, and these spread out in a multitude of thread-like filaments round the prismatic columns, and finally pass into all the cells.* This, again, seems to suggest an analogy with the arrangement by which an electric current, passing through a coil and round a magnet, is used to intensify the magnetic force. A complete knowledge of all the mysteries which have been gradually unfolded from the days of Galvani to those of Faraday, and of many others which are still inscrutable to us, is exhibited in this structure. The laws which are appealed to in the accomplishment of this purpose are many and very complicated; because the conditions to be satisfied refer not merely to the generation of Electric force in the animal to which it is given, but to its effect on the nervous system of the animals against

* Owen's "Lectures on Comp. Anat." vol. ii. (Fishes).

which it is to be employed, and to the conducting medium in which both are moving.

When we contemplate such a structure as this, the idea is borne in with force upon the mind, that the need of conforming to definite conditions seems as absolute a necessity in making an Electric Fish as in making an Electric Telegraph. But the fact of these conditions existing, and requiring to be satisfied,—or, in other words, the fact of so many natural laws demanding a first obedience,—is not the ultimate fact, it is not even the main fact, which Science apprehends in such phenomena as these. On the contrary, that which is most observable and most certain, is the manner in which these conditions are met, complied with, and, by being complied with, are overcome. But this is, in other words, the subordination of many laws to a difficult and curious Purpose,—a subordination which is effected through the instrumentality of a purely mechanical contrivance.

It is no objection to this universal truth, that the machines thus employed in Nature are themselves constructed through the agency of Law. They grow—or, in modern phraseology, they are developed. But this makes no difference in the case —or, rather, it only carries us farther back to other and yet other illustrations of the same truth. This is precisely one of those cases already referred to, in which Causes are unknown, whilst Purposes are clear and certain. The Battery of an Electric Fish is both a means and an end. As respects the electric laws which it puts in motion—that is, as respects the Force which it concentrates—it must be regarded as a means. As respects the organic laws by which it is itself developed it is an end.

What we do know in this case is *why* the apparatus was made; that is to say, what we do know is the Purpose. What we do not know, and have no idea of, is *how* it was made; that is to say, what we do not know is the Law, the Force or Forces, which have been used as the instrument of that Purpose. When Man makes a voltaic Battery, he selects materials which have properties and relations with each other previously ascertained—metals worked out of natural ores, acids distilled out of other natural substances; and he puts these together in

such fashion as he knows will generate the mysterious Force which he desires to evoke and to employ. But how can such a machine be made out of the tissues of a fish? Well may Mr. Darwin say, "It is impossible to conceive by what steps these wondrous organs have been produced." * We see the Purpose —that a special apparatus should be prepared, and we see that it is effected by the production of the machine required; but we have not the remotest notion of the means employed. Yet we can see so much as this, that here again other laws, belonging altogether to another department of Nature—laws of organic growth—are made subservient to a very definite and very peculiar Purpose. The paramount facts disclosed by Science, however, in this case, are these:—first, the adaptation of the animal tissues to form a battery; and, secondly, the Purpose or function of the apparatus, when made, to discharge electric shocks.

There is indeed one objection to this method of conception, which would be a fatal objection if it could be consistently maintained. But all the strength of this objection lies in the obscure terrors which a very long word is sometimes capable of inspiring. This word is "Anthropomorphism." Purpose and Design, it is said, is a human conception. Unquestionably it is, and so is all knowledge in every form. We can never stand outside ourselves. We can never get behind or above our own methods of conception. The human mind can know nothing, and can think of nothing except in terms of its own capacities of thought. But if this be fatal to our knowledge of any of the meanings in creation, it must be equally fatal to our having any knowledge of the very existence of a Creator. Once grant it to be true, "that if we are to apply our human standard to the Creator in one direction, we must apply it in all," †—then it will follow that we cannot conceive any Creator unless it be one as weak, and as corrupt, and as ignorant as ourselves. If this be not bad logic, as on the face of it it clearly is, then it is not "Theology" alone which goes by the board. The purest and most naked Theism is equally destroyed. If it can be said with truth that "the Universal

* "Origin of Species," p. 192, 1st edition.
† Mr. G. H. Lewes, *Fortnightly Review*, July, 1867, p. 109.

Mind is essentially other than the Human Mind," * so that no recognizable relations can exist between them, then that Universal Mind is to us as if it were not. But those who take objection to Anthropomorphism, are not generally prepared to follow it to this extreme conclusion. Mr. Lewes speaks of the sceptical philosophy he supports as "rejecting Atheism"—of Atheism being "an error which it has not maintained,"—of Atheism being not only rash, but "contradictory."† But every conception of a "Mind," even though it be described as "Universal," must be in some degree Anthropomorphic. Our minds can think of another mind only as having some powers and properties which in kind are common with our own. Nor is this objection avoided by any of the other methods of conception which are devised to eliminate from the Order of Nature one of the most patent of its facts. The idea of natural forces working "by themselves" is pre-eminently Anthropomorphic. This is undoubtedly the way in which they seem to us to work when we employ them. The idea of those forces having been so co-ordinated at the first as to produce "necessarily" and "by themselves" all the phenomena of Nature—this is an idea essentially formed on those higher efforts of human ingenuity in virtue of which "self-acting" machines are made. It is quite true, no doubt, that this is one aspect in which the adjustments and contrivances in Nature present themselves to us. But it does not render this idea more Anthropomorphic, but rather less, when we add to it other conceptions—such as the idea of a Mind which is the source of all power, and a Will which is present in all effects. There may be other difficulties in the way of this conception, but not the difficulty of Anthropomorphism. From neither of these conceptions, however, can we eliminate the idea of Purpose and Design.

It is very difficult to divest ourselves of the notion, that whatever happens by way of natural consequence is thereby removed, at least by one degree, from being the expression of Will and the effect of Purpose. We forget that all our own works, not less than the works of Nature, are works done through the means and instrumentality of Law. All that we can effect

* Mr. G. H. Lewes, *Fortnightly Review*, July, 1867, p. 109.
† Ibid. p. 107.

is brought about by way of natural consequence. All our machines are simply contrivances for bringing natural Forces into operation; and these machines themselves we are able to construct only out of the materials and by application of the laws of Nature. The Steam-engine works by way of natural consequence; so does Mr Babbage's Calculating Machine; so does the Electric Telegraph; so does the Solar System. It is true, indeed, that in all human machinery we know by the evidence of sight the ultimate agency to which the machinery is due, whereas in the machinery of Nature the ultimate agency is concealed from sight. But it is the very business and work of Science to rise from the Visible to the Invisible—from what we observe by Sense to what we know by Reason.

And this brings us to the Fifth meaning in which the word Law is habitually used in Science,—a meaning which is indeed well deserving of attention. In this sense, Law is used to designate, not any observed Order of facts,—not any Force to which such Order may be due,—neither yet any combination of Force adjusted to the discharge of function, but—some purely Abstract Idea, which carries up to a higher point our conception of what the phenomena are and of what they do. There may be no phenomena actually corresponding to such Idea, and yet a clear conception of it may be essential to a right understanding of all the phenomena around us. A good example of Law in this sense is to be found in the law which, in the Science of Mechanics, is called the First Law of Motion. The law is, that all Motion is in itself (that is to say, except as affected by extraneous Forces) uniform in velocity, and rectilinear in direction. Thus according to this law a body moving, and not subject to any extraneous Force, would go on moving forever at the same rate of velocity, and in an exactly straight line.

Now, there is no such motion as this existing on the earth or in the heavens. It is an Abstract Idea of Motion which no man has ever, or can ever, see exemplified. Yet a clear apprehension of this Abstract Idea was necessary to a right understanding and to the true explanation of all the motions which are actually seen. It was long before this idea was arrived at; and for want of it, the efforts of Science to explain the visible phenomena of Motion were always taking a wrong direction.

There was a real difficulty in conceiving it, because not only is there no such motion in Nature, but there is no possibility by artificial means of producing it. It is impossible to release any moving body from the impulses of extraneous Force. The First Law of Motion is therefore a purely Abstract Idea. It represents a Rule which never operates as we conceive it, by itself, but is always complicated with other Rules which produce a corresponding complication in result. Like many other laws of the same class, it was discovered, not by looking outwards, but by looking inwards; not by observing, but by thinking. The human mind, in the exercise of its own faculties and powers, sometimes by careful reasoning, sometimes by the intuitions of genius unconscious of any process, is able, from time to time, to reach now one, now another, of those purely Intellectual Conceptions which are the basis of all that is intelligible to us in the Order of the Material World. We look for an ideal order or simplicity in material Law; and the very possibility of exact Science depends upon the fact that such ideal order does actually prevail, and is related to the abstract conceptions of our own intellectual nature. It is in this way that many of the greatest discoveries of Science have been made. Especially have the great pioneers in new paths of discovery been led to the opening of those paths by that fine sense for abstract truths which is the noblest gift of genius. Copernicus, Kepler, and Galileo were all guided in their profound interpretations of visible phenomena by those intuitions which arise in minds finely organized, brought into close relations with the mind of Nature, and highly trained in the exercise of speculative thought. They guessed the truth before they proved it to be true; and those guesses had their origin in Abstract Ideas of the mind which turned out to be ideas really embodied in the Order of the Universe. So constantly has this recurred in the history of Science, that, as Dr. Whewell says, it is not to be considered as an exception, but as the rule.*

Here again it is very instructive to observe how "Law" in

* Whewell's "History of the Inductive Sciences," 2d edition, vol. i. page 434. Speaking of Copernicus, Dr. Whewell says, in another place: "It is manifest that in this, as in other cases of discovery, a clear and steady possession of abstract Ideas, and an aptitude in comprehending real Facts under these general conceptions, must have been leading characters in the Discoverer's mind."—Vol. i. p. 389.

this last sense is dealt with by the Positive Philosophy. Scientific men are accustomed to reckon such Laws as the First Law of Motion among the surest possessions of pure Intellect, and the faculty by which they are conceived among the noblest proofs of its energy and power. Positivism, on the contrary, regards such laws as mere "artifices" of thought, and the Power by which they are conceived not as a Strength, but as an "Infirmity" of Mind.* I do not deny that the process by which these Abstractions are attained is a metaphysical process,—that is to say, they are purely mental conceptions. But the process which denies "reality" to these conceptions is also purely a metaphysical process, with this only difference, that it is bad metaphysics instead of good. The analysis which evolves these abstract Laws out of the phenomena of Nature is an analysis which truly co-ordinates the order of those phenomena with an Order of Thought. The counter Analysis which pronounces them to be mere artifices of Thought, and "preliminary falsifications of fact," is an attempt to make Reason disbelieve herself, and immerses us at once in the worst kind of Metaphysics—that which has made the name almost opprobrious—even the old Scholastic subtleties of the Nominalistic and the Realistic controversy.

And now having traced the various senses in which Law is used, we can form some estimate on the value of those conclusions of which some men are so boastful and of which other men are so much afraid. We can see how much and how little is really meant when it is said that Law can be traced in all things, and all things can be traced to Law. It is a great mistake to suppose that, in establishing this conclusion, the progress of modern investigation is in a direction tending to Materialism. This may be and always has been the tendency of individual minds. There are men who would stare into the very Burning Bush without a thought that the ground on which they stand must be Holy Ground. It is not now of wood or stone that men make their Idols, but of their own abstract conceptions. Before these, borrowing for them the attributes of

* "Science is distinguished from common knowledge by its conscious employment of artifices which our infirmity renders indispensable." Again, "Abstraction is one of the necessary (from infirmity) artifices of research."—Lewes's "Prologue," p. lxxxix.

Personality, they bow down and worship. Nothing is more common than to find men who may be trusted thoroughly on the facts of their own Science, who cannot be trusted for a moment on the place which those facts assume in the general system of truth. Philosophy must include Science; but Science does not necessarily include Philosophy. There are, and there always have been, some special misconceptions connected with the prosecution of physical research. It is, however, on the surface of things, rather than below it, that the suggestions of Materialism lie thickest to the eye. They abound among the commonest facts which obtrude themselves on our attention in Nature and in human life. When the bursting of some small duct of blood upon the Brain is seen to destroy in a moment the Mind of Man, and to break down all the powers of his Intellect and his Will, we are in presence of a fact whose significance cannot be increased by a million of other facts analogous in kind.

Yet on every fresh discovery of a few more such facts, there is generally some fresh outbreak of old delusions respecting the forms and the Laws of Matter as the supreme realities of the world. But when the new facts have been looked at a little longer, it is always seen that they take their place with others which have been long familiar, and the eternal problems which lie behind all natural phenomena are seen to be unaffected and unchanged. Like the most distant of the Fixed Stars, they have no parallax. The whole orbit of human knowledge shows in them no apparent change of place. No amount of knowledge of the kind which alone physical Science can impart can do more than widen the foundation of intelligent spiritual beliefs. We think that Astronomy and Geology have given to us in these latter days ideas wholly new in respect to Space and Time. Yet, after all, can we express those ideas, or can we indicate the questions they suggest, in any language which approaches in power to the majestic utterances of David and of Job? We know more than they knew of the magnitude of the Heavenly Bodies; but what more can we say than they said of the wonder of them,—of Orion, of Arcturus, and the Pleiades?* We know that the earth moves, which

* Job ix. 9.

they did not know; and we know that the rapid rotation of a globe on its own axis is a means of maintaining the steadiness of that axis in its course through Space. But what effect, except that of increasing its significance, has this knowledge upon the praise which David ascribes to that ultimate Agency which has made the round world so sure "that it cannot be moved?" *

And so of other departments of Science. Even the modern idea of Law, of the constancy and therefore the trustworthiness of Natural Forces, has been known, not indeed scientifically but instinctively, to Man since first he made a Tool, and used it as the instrument of Purpose. What has Science added to this idea, except that the same rule prevails as widely as the Universe, and is made subservient in a like manner to Knowledge and to Will? In the enthusiasm awakened by the discovery of some new facts, or of some new forces, and in the freshness with which they impress the idea of such agencies on our minds, we sometimes very naturally exaggerate the length of way along which they carry us towards the great ultimate objects of intellectual desire. We forget altogether that the knowledge they convey is in quality and in kind identical with knowledge already long in our possession, and places us in no new relation whatever to the vast background of the Eternal and the Unseen. Thus it is that the notions of Materialism are perpetually reviving, and are again being perpetually swept away—swept away partly before the Intuitions of the Mind, partly before the Conclusions of the Reason. For there are two great enemies to Materialism,—one rooted in the Affections, the other in the Intellect. One is the power of THINGS HOPED FOR—a power which never dies: the other is the evidence of THINGS NOT SEEN—and this evidence abounds in all we see. In re-enforcing this evidence, and in adding to it, Science is doing boundless work in the present day. It is not the extent of our knowledge, but rather the limits of it that physical research teaches us to see and feel the most. Of course, in so far as its discoveries are really true, its influence must be for good. To doubt this were to doubt that all truth is true, and that all truth is God's.

* Ps. xciii. 1.

There are eddies in every stream—eddies where rubbish will collect, and circle for a time. But the ultimate bearing of scientific truth cannot be mistaken. Nothing is more remarkable in the present state of physical research than what may be called the transcendental character of its results. And what is transcendentalism but the tendency to trace up all things to the relation in which they stand to abstract Ideas? And what is this but to bring all physical phenomena nearer and nearer into relation with the phenomena of Mind? The old speculations of Philosophy which cut the ground from Materialism by showing how little we know of Matter, are now being daily re-enforced by the subtle analysis of the Physiologist, the Chemist, and the Electrician. Under that analysis Matter dissolves and disappears, surviving only as the phenomena of Force; which again is seen converging along all its lines to some common centre—"sloping through darkness up to God."*

Even the writers who have incurred most reasonable suspicion as to the drift of their teaching, give nevertheless constant witness to what may be called the purely mental quality of the ultimate results of physical inquiry. It has been said with perfect truth that "the fundamental ideas of modern Science are as transcendental as any of the axioms in ancient philosophy.† We have seen that one of the senses in which Law is habitually used is to designate abstract ideas and doctrines of this kind. So far from these doctrines and ideas having a tendency to Materialism, they serve rather to bring inside the strict domain of Science ideas which in the earlier stages of human knowledge lay wholly within the region of Faith or of Belief. For example, the writer of the Epistle to the Hebrews specially declares that it is by Faith that we understand "that the things which are seen were not made of the things which do appear." Yet this is now one of the most assured doctrines of Science, —that invisible Forces are behind and above all visible phenomena, moulding them in forms of infinite variety, of all which forms the only real knowledge we possess lies in our perception of the Ideas they express—of their beauty, or of their fitness,—in short, of their being all the work of "Toil cooperant to an End."

* Tennyson's "In Memoriam." † Lewes's "Philosophy of Aristotle," p. 66.

Every natural Force which we call a law is itself invisible—the idea of it in the mind arising by way of necessary inference out of an observed Order of facts. And very often, if not always, in our conception of these Forces, we are investing them with the attributes of Intelligence and of Will at the very moment, perhaps, when we are stumbling over the difficulty of seeing in them the exponents of a Mind which is intelligent and of a Will which is Supreme. The deeper we go in Science, the more certain it becomes that all the realities of Nature are in the region of the Invisible, so that the saying is literally, and not merely figuratively true, that the things which are seen are temporal, and it is only the things which are not seen that are eternal. For example, we never see the phenomena of Life dissociated from Organization. Yet the profoundest physiologists have come to the conclusion that Organization is not the cause of Life, but, on the contrary, that Life is the cause of Organization,—Life being something—a Force of some kind, by whatever name we may call it—which precedes Organization, and fashions it, and builds it up. This was the conclusion come to by the great anatomist Hunter, and it is the conclusion endorsed in our own day by such men as Dr. Carpenter and Professor Huxley,—men neither of whom have exhibited in their philosophy any undue bias towards either theological or metaphysical explanations. One illustration referred to by these writers is derived from the shells—the beautiful shells—of the animals called the "Foraminifera." * No Forms in Nature are more exquisite. Yet they are the work and the abode of animals which are mere blobs of jelly—without parts, without organs—absolutely without visible structure of any kind. In this jelly, nevertheless, there works a "vital Force" capable of building up an Organism of most complicated and perfect symmetry.

But what is a vital Force? It is something which we cannot see, but of whose existence we are as certain as we are of its visible effects—nay, which our reason tells us precedes and is superior to these. We often speak of Material Forces as if we could identify any kind of Force with Matter. But this is only one of the many ambiguities of language. All that we mean

* "The Elements of Comparative Anatomy," (Huxley,) pp. 10, 11.

by a Material Force is a force which acts upon Matter, and produces in Matter its own appropriate effects. We must go a step further therefore and ask ourselves, What is Force? What is our conception of it? What idea can we form, for example, of the real nature of that Force, the measure of whose operation has been so exactly ascertained—the Force of Gravitation? It is invisible—imponderable—all our words for it are but circumlocutions to express its phenomena or effects.

There are many kinds of force in Nature—which we distinguish after the same fashion—according to their effects or according to the forms of Matter in which they become cognizable to us. But if we trace all our conceptions on the nature of Force to their fountain-head, we shall find that they are formed on our own consciousness of Living Effort—of that force which has its seat in our own vitality, and especially on that kind of it which can be called forth at the bidding of the Will. In saying this I do not mean to borrow from that false philosophy which pretends by the exercise of reason to get behind all the intuitive convictions on which reason rests. It is in this way that men have come to argue on what they call the "reality of an external world." Even if there were no process of reasoning capable of defending that reality, this would not lend a reasonable character to doubts regarding it. Reason must start from some postulate—some primary truths which cannot be denied. But we need not assume the reality of an external world to be one of these. Yet if it be not a first step, it is a second step hardly distinguishable from the first. Self-existence is of course the truth which may be regarded as the first of all, but in the very idea of Self the existence of that which is Not-Self is necessarily involved. In connecting, however, our conceptions of Force with the consciousness of Living Effort in ourselves, we must guard against mistaking analogy for identity, and against confounding together two items of knowledge which are quite distinct. Correlative with the consciousness of Living Effort in ourselves, and inseparable from it, there is the consciousness of Force acting on us, as well as acting in us. And this argument applies equally whether Self be regarded as a perceiving Mind, or as a physical Organism through which Mind perceives. Thus the knowledge of an ex-

ternal world—that is to say, the knowledge of external Force—stands side by side with the knowledge of Self. Nothing can be known except as distinguished from other things; and all things which are distinguishable from each other, are, in a sense, and in the measure of that distinction, known. And so we know the existence both of internal and of external Force. But if we come to ask ourselves farther questions, as to the nature and seat of Material Force, we can only think of it in the terms of the Vital Force exerted by ourselves. If we can ever know anything of the nature of any Force, it ought to be of this one. And yet the fact is that we know nothing. If, then, we know nothing of that kind of Force which is so near to us, and with which our own Intelligence is in such close alliance, much less can we know the ultimate nature of Force in its other forms.

It is important to dwell on this, because both the aversion with which some men regard the idea of the Reign of Law, and the triumph with which some others hail it, are founded on a notion that, when we have traced any given phenomena to what are called Natural Forces, we have traced them farther than we really have. We know nothing of the ultimate nature, or of the ultimate seat of Force. Science, in the modern doctrine of the Conservation of Energy, and the Convertibility of Forces, is already getting something like a firm hold of the idea that all kinds of Force are but forms or manifestations of some one Central Force issuing from some one Fountain-head of Power. Sir John Herschel has not hesitated to say, that "it is but reasonable to regard the Force of Gravitation as the direct or indirect result of a Consciousness or a Will existing somewhere."* And even if we cannot certainly identify Force in all its forms with the direct energies of One Omnipresent and all-pervading Will, it is at least in the highest degree unphilosophical to assume the contrary—to speak or to think as if the Forces of Nature were either independent of, or even separate from, the Creator's Power.

It follows, then, from these considerations, that whatever difficulty there may be in conceiving of a Will not exercised by a visible Person, it is a difficulty which cannot be evaded by

* "Outlines of Astronomy," 5th edition, p. 291.

arresting our conceptions at the point at which they have arrived in forming the idea of Laws or Forces. That idea is itself made up out of elements derived from our own consciousness of Personality. This fact is seen by men who do not see the interpretation of it. They denounce as a superstition the idea of any Personal Will separable from the Forces which work in Nature. They say that this idea is a mere projection of our own Personality into the world beyond—the shadow of our own Form cast upon the ground on which we look. And indeed this, in a sense, is true. It is perfectly true that the Mind does recognize in Nature a reflection of itself. But if this be a deception, it is a deception which is not avoided by transferring the idea of Personality to the abstract Idea of Force, or by investing combinations of Force with the attributes of Mind.

We need not be jealous, then, when new domains are claimed as under the Reign of Law—an agency through which we see working everywhere some Purpose of the Everlasting Will. There are many things in Nature of which we do not see the reason; and many other things of which we cannot find out the cause; but there are none from which we exclude the idea of Purpose by success in discovering the cause. It has been said, with perfect truth, by a living naturalist who is of all others most opposed to what he calls Theological explanations in Science, that we may just as well speak of a watch as the abode of a "watch-force," as speak of the organization of an animal as the abode of a "vital Force." * The analogy is precise and accurate. The Forces by which a watch moves are natural Forces. It is the relation of interdependence in which those Forces are placed to each other, or, in other words, the adjustment of them to a particular Purpose, which constitutes the "watch-force;" and the seat of this Force—which is in fact no one Force, but a combination of many Forces—is in the Intelligence which conceived that combination, and in the Will which gave it effect. The mechanisms devised by Man are in this respect only an image of the more perfect mechanism of Nature, in which the same principle of Adjustment is always the highest result which Science can ascertain or recognize. There is this difference,

* Lewes's "Philosophy of Aristotle," p. 87.

indeed,—that in regard to our works we see that our knowledge of natural laws is very imperfect, and our control over them is very feeble ; whereas in the machinery of Nature there is evidence of complete knowledge and of absolute control. The universal rule is, that everything is brought about by way of Natural Consequence. But another rule is, that all natural consequences meet and fit into each other in endless circles of Harmony and of Purpose. And this can only be explained by the fact that what we call Natural Consequence is always the conjoint effect of an infinite number of elementary Forces, whose action and reaction are under direction of the Will which we see obeyed, and of the Purposes which we see actually attained.

It is, indeed, the completeness of the analogy between our own works on a small scale, and the works of the Creator on an infinitely large scale, which is the greatest mystery of all. Man is under constraint to adopt the principle of Adjustment, because the Forces of Nature are external to and independent of his Will. They may be managed, but they cannot be disobeyed. It is impossible to suppose that they stand in the same relation to the Will of the Supreme ; yet it seems as if He took the same method of dealing with them—never violating them, never breaking them, but always ruling them by that which we call Adjustment or Contrivance. Nothing gives us such an idea of the immutability of Laws as this ! nor does anything give us such an idea of their pliability to use. How imperious they are, yet how submissive ! How they reign, yet how they serve !

CHAPTER III.

CONTRIVANCE A NECESSITY ARISING OUT OF THE REIGN OF LAW—EXAMPLE IN THE MACHINERY OF FLIGHT.

THE necessity of Contrivance for the accomplishment of Purpose arises out of the immutability of Natural Forces. They must be conformed to, and obeyed. Therefore, where they do not serve our purpose directly, they can only be made to serve it by ingenuity and contrivance. This necessity, then, may be said to be the index and the measure of the power of Law. And so, on the other hand, the certainty with which Purpose can be accomplished by Contrivance, is the index and the measure of mental knowledge and resource. It is by wisdom and knowledge that the Forces of Nature—even those which may seem most adverse—are yoked to service. This idea of the relation in which Law stands to Will, and in which Will stands to Law, is familiar to us in the works of Man: but it is less familiar to us as equally holding good in the works of Nature. We feel, sometimes, as if it were an unworthy notion of the Will which works in Nature, to suppose that it should never act except through the use of means. But our notions of unworthiness are themselves often the unworthiest of all. They must be ruled and disciplined by observation of that which is,—not founded on *à priori* conceptions of what ought to be. Nothing is more certain than that the whole Order of Nature is one vast system of Contrivance. And what is Contrivance but that kind of arrangement by which the unchangeable demands of Law are met and satisfied? It may be that all natural Forces are resolvable into some One Force; and indeed in the modern doctrine of the Correlation of Forces, an idea which is a near approach to this, has already entered the domain of Science. It may also be that this One Force, into which all others return again, is itself but a mode of action of the Divine Will. But we have no instruments whereby to reach this last analysis.

Whatever the ultimate relation may be between mental and material Force, we can at least see clearly this,—that in Nature there is the most elaborate machinery to accomplish Purpose through the instrumentality of means. It seems as if all that is done in Nature as well as all that is done in art, were done *by knowing how to do it.* It is curious how the language of the great Seers of the Old Testament corresponds with this idea. They uniformly ascribe all the operations of Nature—the greatest and the smallest—to the working of Divine Power. But they never revolt—as so many do in these weaker days—from the idea of this Power working by wisdom and knowledge in the use of means; nor, in this point of view, do they ever separate between the work of first Creation, and the work which is going on daily in the existing world. Exactly the same language is applied to the rarest exertions of power, and to the gentlest and most constant of all natural operations. Thus the saying that "The Lord by wisdom hath founded the Earth; by understanding hath He established the Heavens,"—is coupled in the same breath with this other saying, "By His knowledge the depths are broken up, and the clouds drop down the dew." *

Every instance of Contrivance which we can thoroughly follow and understand, has an intense interest—as casting light upon this method of the Divine government, and upon the analogy between the operations of our own minds and the operations of the Creator. Some instances will strike us more than others —and those will strike us most which stand in some near comparison with our own human efforts of ingenuity and contrivance. There is one such instance which I propose to consider in this chapter—the machinery by which a great purpose has been accomplished in Nature—a purpose which Man has never been able to accomplish in art, and that is the Navigation of the Air. No more beautiful example can be found, even in the wide and rich domain of Animal Mechanics—none in which we can trace more clearly, too, the mode and method in which laws the most rigorous and exact are used as the supple instruments of Purpose.

"The way of an Eagle in the air" was one of the things of which Solomon said, that "he knew it not." No wonder that

* Prov. iii. 19, 20.

the Wise King reckoned it among the great mysteries of Nature! The Force of Gravitation, though its exact measure was not ascertained till the days of Newton, has been the most familiar of all Forces in all ages of Mankind. How, then, in violation of its known effects, could heavy bodies be supported upon the thin air—and be gifted with the power of sustaining and directing movements more easy, more rapid, and more certain than the movements of other animals upon the firm and solid earth? No animal motion in Nature is so striking or so beautiful as the

> "Scythe-like sweep of wings, that dare
> The headlong plunge through eddying gulfs of air."
> "*Wayside Inn*," LONGFELLOW.

Nor will the wonder cease when, so far as the mechanical problem is concerned, the mystery of flight is solved. If we wish to see how material laws can be bent to purpose, we shall study this problem.

In the first place, it is remarkable that the Force which seems so adverse—the Force of Gravitation drawing down all bodies to the earth—is the very Force which is the principal one concerned in flight, and without which flight would be impossible. It is curious how completely this has been forgotten in almost all human attempts to navigate the air. Birds are not lighter than the air, but immensely heavier. If they were lighter than the air they might float, but they could not fly. This is the difference between a Bird and a Balloon. A Balloon rises because it is lighter than the air, and floats upon it. Consequently, it is incapable of being directed, because it possesses in itself no active Force enabling it to resist the currents of the air in which it is immersed, and because, if it had such a force, it would have no fulcrum, or resisting medium against which to exert it. It becomes, as it were, part of the atmosphere, and must go with it where it goes. No Bird is ever for an instant of time lighter than the air in which it flies; but being, on the contrary, always greatly heavier, it keeps possession of a Force capable of supplying momentum, and therefore capable of overcoming any lesser Force, such as the ordinary resistance of the atmosphere, and even of heavy gales of wind. The Law of Gravitation, therefore, is used in the flight of Birds as one of

the most essential of the Forces which are available for the accomplishment of the end in view.

The next law appealed to, and pressed into the service, is again a law which would seem an impediment in the way. This is the resisting force of the atmosphere in opposing any body moving through it. In this force an agent is sought and found for supplying the requisite balance to the Force of Gravity. But in order that the resisting force of air should be effectual for this purpose, it must be used under very peculiar conditions. The resisting force of fluids, and of airs or gases, is a force acting equally in all directions, unless special means are taken to give it predominant action in some special direction. If it is a force strong enough to prevent a body from falling, it is also a force strong enough to prevent it from advancing. In order, therefore, to solve the problem of flight, the resisting power of the air must be called into action as strongly as possible in the direction opposite to the Force of Gravity, and as little as possible in any other. Consequently a body capable of flight must present its maximum of surface to the resistance of the air in the perpendicular direction, and its minimum of surface in the horizontal direction. Now, both these conditions are satisfied (1) by the great breadth or length of surface presented to the air perpendicularly in a Bird's expanded wings, and by (2) the narrow lines presented in its shape horizontally, when in the act of forward motion through the air. But something more yet is required for flight. Great as the resisting force of air is, it is not strong enough to balance the Force of Gravity by its mere pressure on an expanded wing—unless that pressure is increased by an appeal to yet other laws—and other properties of its nature. Every sportsman must have seen cases in which a flying Bird has been so wounded as to produce a rigid expansion of the wings. This does not prevent the Bird from falling, although it breaks the fall, and makes it come more or less gently to the ground.

Yet further, therefore, to accomplish flight, another law must be appealed to, and that is the immense elasticity of the air, and the reacting force it exerts against compression. To enable an animal heavier than the air to support itself against the

Force of Gravity, it must be enabled to strike the air downwards with such force as to occasion a rebound upwards of corresponding power. The wing of a flying animal must, therefore, do something more than barely balance Gravity. It must be able to strike the air with such violence as to call forth a reaction equally violent, and in the opposite direction. This is the function assigned to the powerful muscles by which the wings of Birds are flapped with such velocity and strength. We need not follow this part of the problem further, because it does not differ in kind from the muscular action of other animals. The connection, indeed, between the Wills of animals and the mechanism of their frame, is the last and highest problem of all in the mechanics of Nature; but it is merged and hid forever in the one great mystery of Life. But so far as this difficulty is concerned, the action of an Eagle's wing is not more mysterious than the action of a Man's arm. There is a greater concentration of muscular power in the organism of Birds than in most other animal frames; because it is an essential part of the problem to be solved in flight, that the engine which works the wings should be very strong, very compact, of a special form, and that, though heavier than the air, it should not have an excessive weight. These conditions are all met in the power, in the outline, and in the bulk of the pectoral muscles which move the wings of Birds. Few persons have any idea of the force expended in the action of ordinary flight. The pulsations of the wing in most Birds are so rapid that they cannot be counted. Even the Heron seldom flaps its wings at a rate of less than from 120 to 150 strokes in a minute. This is counting only the downward strokes, preparatory to each one of which there must be an upward stroke also; so that there are from 240 to 300 separate movements per minute. Yet the Heron is remarkable for its slow and heavy flight, and it is difficult to believe, until one has timed the pulsations with a watch, that they have a rapidity approaching to two in a second. But this difficulty is an index to the enormous comparative rapidity of the faster-flying Birds. Let any one try to count the pulsations of the wing in ordinary flight of a Pigeon, or of a Blackcock, or of a Partridge, or, still more, of any of the diving sea-fowl. He will find that though,

in the case of most of these Birds, the quickness of sight enables him to see the strokes separate from each other, it is utterly impossible to count them; whilst in some Birds, especially in the Divers, as well as in the Pheasant and Partridge tribe, the velocity is so great that the eye cannot follow it at all, and the vibration of the wings leaves only a blurred impression on the eye.

Our subject here, however, is not so much the amount of vital force bestowed on Birds, as the mechanical laws which are appealed to in order to make that force effective in the accomplishment of flight. The elasticity of the air is the law which offers itself for the counteraction of gravity. But, in order to make it available for this purpose, there must be some great force of downward blow in order to evoke a corresponding rebound in the opposite, or upward direction. Now, what is the nature of the implement required for striking this downward blow? There are many conditions it must fulfil. First, it must be large enough in area to compress an adequate volume of air; next, it must be light enough in substance not to add an excess of weight to the already heavy body of the Bird; next, it must be strong enough in frame to withstand the pressure which its own action on the air creates. The first of these conditions is met by an exact adjustment of the size or area of the wing to the size and weight of the Bird which it is to lift. The second and the third conditions are both met by the provision of a peculiar substance, feathers, which are very light and very strong; whilst the only heavy parts of the framework, namely, the bones in which the feathers are inserted, are limited to a very small part of the area required.

But there is another difficulty to be overcome—a difficulty opposed by natural laws, and which can only be met by another adjustment, if possible more ingenious and beautiful than the rest. It is obvious that if a Bird is to support itself by the downward blow of its wings upon the air, it must at the end of each downward stroke lift the wing upwards again, so as to be ready for the next. But each upward stroke is in danger of neutralizing the effect of the downward stroke. It must be made with equal velocity, and if it required equal force it must produce equal resistance,—an equal rebound from the elas-

ticity of the air. If this difficulty were not evaded somehow, flight would be impossible. But it is evaded by two mechanical contrivances, which, as it were, triumph over the laws of aërial resistance by conforming to them. One of these contrivances is, that the upper surface of the wing is made convex, whilst the under surface is concave. The enormous difference which this makes in atmospheric resistance is familiarly known to us by the difference between the effect of the wind on an umbrella which is exposed to it on the under or the upper side. The air which is struck by a concave or hollow surface is gathered up, and prevented from escaping; whereas the air struck by a convex or bulging surface escapes readily on all sides, and comparatively little pressure or resistance is produced. And so, from the convexity of the upper surface of a Bird's wing, the upward stroke may be made with comparatively trifling injury to the force gained in the downward blow.

But this is only half of the provision made against a consequence which would be so fatal to the end in view. The other half consists in this—that the feathers of a Bird's wing are made to *underlap each other*, so that in the downward stroke the pressure of the air closes them upwards against each other, and converts the whole series of them into one connected membrane, through which there is no escape; whilst in the upward stroke the same pressure has precisely the reverse effect—it opens the feathers, separates them from each other, and converts each pair of feathers into a self-acting valve, through which the air rushes at every point. Thus the same implement is changed in the fraction of a second from a close and continuous membrane which is impervious to the air, into a series of disconnected joints through which the air passes without the least resistance—the machine being so adjusted that when pressure is required the maximum of pressure is produced, and, when pressure is to be avoided, it is avoided in spite of rapid and violent action.

This, however, exhausts but a small part of the means by which Law is made to do the work of Will in the machinery of flight. It might easily be that violent and rapid blows, struck downwards against the elastic air, might enable animals possessed of such power to lift themselves from the ground and nothing

more. There is a common toy which lifts itself in this manner from the force exerted by the air in resisting, and reacting upon little vanes which are set spinning by the hand. But the toy mounts straight up, and is incapable of horizontal motion. So, there are many structures of wing which might enable animals to mount into the air, but which would not enable them to advance or to direct their flight. How, then, is this essential purpose gained? Again we find an appeal made to natural laws, and advantage taken of their certainty and unchangeableness.

The power of forward motion is given to Birds, first by the direction in which the whole wing feathers are set, and next by the structure given to each feather in itself. The wing feathers are all set backwards,—that is, in the direction opposite to that in which the Bird moves; whilst each feather is at the same time so constructed as to be strong and rigid toward its base, and extremely flexible and elastic towards its end. On the other hand, the front of the wing, along the greater part of its length, is a stiff hard edge, wholly unelastic and unyielding to the air. The anterior and posterior webs of each feather are adjusted on the same principle. The consequence of this disposition of the parts as a whole, and of this construction of each of the parts, is, that the air which is struck and compressed in the hollow of the wing, being unable to escape *through* the wing, owing to the closing upwards of the feathers against each other, and being also unable to escape *forwards* owing to the rigidity of the bones and of the quills in that direction, finds its easiest escape *backwards*. In passing backwards it lifts by its force the elastic ends of the feathers; and thus whilst effecting this escape, in obedience to the law of action and reaction, it communicates, in its passage along the whole line of both wings, a corresponding push forwards to the body of the Bird. By this elaborate mechanical contrivance the same volume of air is made to perform the double duty of yielding pressure enough to sustain the Bird's weight against the Force of Gravity, and also of communicating to it a forward impulse. The Bird, therefore, has nothing to do but to repeat with the requisite velocity and strength its perpendicular blows upon the air,

and by virtue of the structure of its wings the same blow both sustains and propels it.*

The truth of this explanation of the mechanical theory of flight may be tested in various ways. In the first place it is quite visible to the eye. In many birds flying straight to us, or straight from us, the effect of aërial resistance in bending upwards the ends of the quill feathers is very conspicuous. The flight of the common Rook affords an excellent example—where the Bird is seen foreshortened. In Eagles the same effect is very marked—the wing tips forming a sharp upward curve. I have seen it equally obvious in that splendid Bird the Gannet, or Solan Goose; and when we recollect the great weight which those few quill feathers are thus seen sustaining, we begin to appreciate the degree in which lightness, strength, and imperviousness to the passage of air are combined in this wonderful implement of flight.

But perhaps the simplest test of the action and reaction of the air and the wing feathers in producing forward motion is an actual experiment. If we take in the hand the stretched wing of a Heron, which has been dried in that position, and strike it quickly downwards in the air, we shall find that it is very difficult indeed to maintain the perpendicular direction of the stroke, requiring, in fact, much force to do so, and that if we do not apply this force, the hand is carried irresistibly *forward*, from the impetus in that direction which the air communicates to the wing in its escape backwards from the blow

Another test is one of reasoning and observation. If the explanation now given be correct, it must follow that since no Bird can flap its wings in any other direction than the vertical—*i.e.*, perpendicular to its own axis (which is ordinarily horizontal)—and as this motion has been shown to produce necessarily a forward motion, *no Bird can ever fly backwards*. Accordingly no Bird ever does so—no man ever saw a Bird, even for an instant, fly tail foremost. A Bird can, of course, allow itself to fall backwards by merely *slowing* the action of its wings

* The upward stroke has no sustaining power, but has considerable propelling power; because some air, failing to escape between the feathers, must always pass along the convex surface of the wing, and, escaping backwards, must exert upon the ends of the quills a similar reactive force to that which is exerted in the downward stroke.

so as to allow its weight to overcome their sustaining power; and this motion may sometimes give the appearance of flying backwards,—as when a Swift drops backwards from the eaves of a house, or when a Humming Bird allows itself to drop in like manner from out of the large tubular petals of a flower. But this backward motion is due to the action of gravity, and not to the action of the Bird's wing. In short, it is falling downwards, not flying backwards. Nay, more, if the theory of flight here given be correct, it must equally follow that even standing still, which is the easiest of all things to other animals, must be very difficult, if not altogether impossible, to a Bird when flying. This also is true in fact. To stand still in the air is not indeed impossible to a flying Bird, for reasons to be presently explained, but it is one of the most difficult feats of *wingmanship*,—a feat which many Birds, not otherwise clumsy, can never perform at all, and which is performed only by special exertion, and generally for a very short time, by those Birds whose structure enables them to be adepts in their glorious art.

It cannot be too often repeated—because misconception on this point has been the cardinal error in human attempts to navigate the air—that in all the beautiful evolutions of birds upon the wing, it is weight, and not buoyancy, which makes those evolutions possible. It supplies them, so to speak, with a store of Force which is constant, inexhaustible, inherent in the very substance of themselves, and entirely independent of any muscular exertion. All they have to do is to give direction to that internal Force, by acting on the external Force of aërial currents, through the contraction and expansion of the implements which have been given them for that purpose. Those who have watched the flight of Birds with any care, must have observed that when once they have attained a certain initial velocity and a certain elevation, by rapid and repeated strokes upon the air, they are then able to fly with comparatively little exertion, and very often to pursue their course for long distances without any flapping whatever of the wings. The contrast between the violent efforts required for the first acquisition of the initial velocity, and the perfect ease with which

flight is performed after it has been acquired, is a contrast described by Virgil in lines of incomparable beauty:—

> "Qualis speluncâ subito commota columba,
> Cui domus et dulces latebroso in pumice nidi,
> Fertur in arva volans, plausumque exterrita pennis
> Dat tecto ingentem; mox, aëre lapsa quieto,
> Radit iter liquidum, celeres neque commovet alas."
>
> *Æn.* lib. v. 213–17.

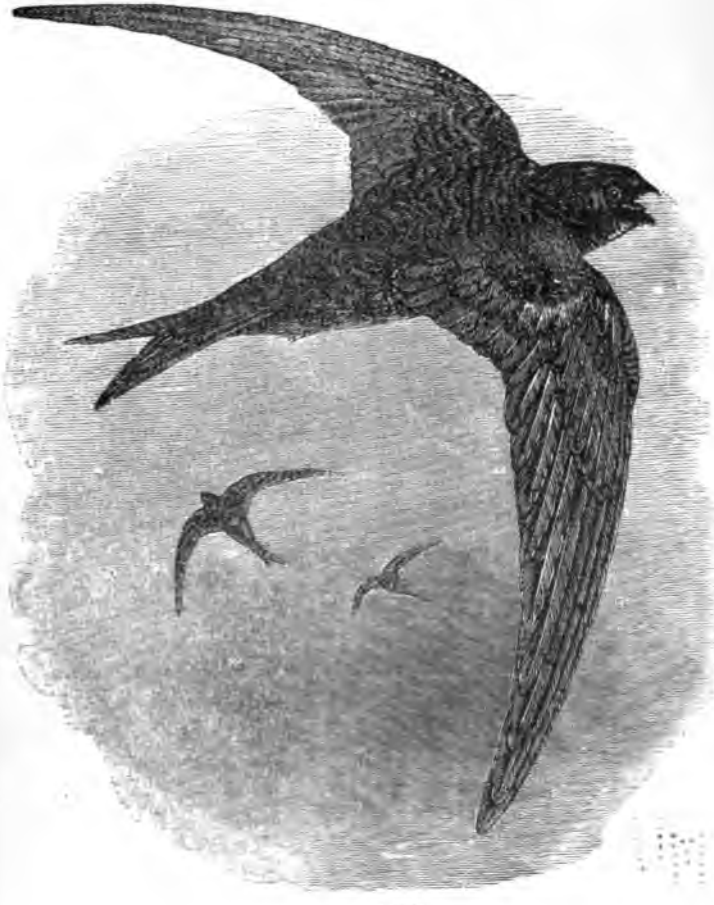
Still more remarkable, as showing the power and the value of weight in flight, is the fact that Birds are able to resume rapid and easy motion not only as the result of a previously-acquired momentum, but after "soaring" in an almost perfectly stationary position. Nothing, for example, is more common than to see Sea Gulls, and some large species of Hawks, "soaring" one moment (that is, all the forces bearing on the Bird brought to an equilibrium, and all motion brought consequently to nearly a perfect standstill), and the next moment sailing onwards in rapid and apparently effortless progression. Now, how is this effect produced? If we only think of it, the question ought rather to be, How is it ever prevented? The soaring is a much more difficult thing to do than the going onwards. It cannot be done at all in a perfectly still atmosphere. It can only be done when there is a breeze of sufficient strength. Gravity is ceaselessly acting on the Bird to pull it downwards: and downwards it must go, unless there is a countervailing Force to keep it up. This force is the force of the breeze striking against the vanes of the wings. But in order to bring these two forces to nearly a perfect balance, and so to "soar," the Bird must expand or contract its wings exactly to the right size, and hold them exactly at the right angle. The slightest alteration in either of these adjustments produces instantly an upsetting of the balance, and of course a resulting motion. The exact direction of that motion will depend on the degree in which the wing is contracted, and the degree in which its angle to the wind is changed. If the wing is very much contracted, and at the same time held off from the wind, that motion will be steeply downwards. Accordingly this is the action of a Hawk when it swoops upon its prey from a great height above it. I

have seen a Merlin dash down from a great distance with its wings so closed as to seem almost wholly folded. The Gannet in diving for fish does not close its wings at all, but turning them and the whole axis of its body into the perpendicular, and thus allowing its great weight to act without any counteraction, dashes itself into the sea with foam. But every variety of forward motion is attained by different degrees of contraction and exposure, according to the strength of the breeze with which the Bird has to deal. The limit of its velocity is the limit of its momentum, and the limit of its momentum is the limit of its weight. The lightness of a Bird is therefore a limit to its velocity. The heavier a Bird is, the greater is its possible velocity of flight—because the greater is the store of Force—or to use the language of modern physics, the greater is the quantity of "potential energy" which, with proper implements to act upon aërial resistance, it can always convert into upward, or horizontal, or downward motion, according to its own management and desires.

It will be at once seen from this view of the forces concerned in flight, that the common explanation of Birds being assisted by air-cells for the inhalation and storage of heated air, must not only be erroneous, but founded on wholly false conceptions of the fundamental mechanical principles on which flight depends. If a Bird could inhale enough warm air to make it buoyant, its power of flight would be effectually destroyed. It would become as light as a Balloon, and consequently as helpless. If, on the other hand, it were merely to inflate itself with a small quantity of hot air insufficient to produce buoyancy, but sufficient to increase its bulk, the only effect would be to expose it to increased resistance in cleaving the air. It is true, indeed, that the bones of Birds are made more hollow and lighter than the bones of Mammals, because Birds, though requiring weight, must not have too much of it. It is true, also, that the air must have access to these hollows, else they would be unable to resist atmospheric pressure. But it is no part whatever of the plan or intention of the structure of Birds, or of any part of that structure, to afford balloon-space for heated air with a view to buoyancy.

And here, indeed, we open up a new branch of the same

inquiry, showing, in new aspects, how the universality and unchangeableness of all natural laws are essential to the use of them as the instruments of Will, and how by being played off against each other they are made to express every shade of thought, and the nicest change of purpose. The movement of all flying animals in the air is governed and determined by Forces of muscular power, and of aërial resistance and elasticity, being brought to bear upon the Force of Gravity, whereby, according to the universal laws of motion, a direction is given to the animal which is the resultant, or compromise, between all the Forces so employed. Weight, as we have seen, is one of these Forces—absolutely essential to that result, and no flying animal can ever for a moment of time be buoyant, or lighter than the air in which it is designed to move. But it is obvious that, within certain limits, the proportion in which these different Forces are balanced against each other admits of immense variety. The limits of variation can easily be specified. Every flying animal must have muscular power great enough to work its own size of wing: that size of wing must be large enough to act upon a volume of air sufficient to lift the animal's whole weight: lastly, and consequently, the weight must not be too great, or dispersed over too large a bulk. But within these limits there is room for great varieties of adjustments, having reference to corresponding varieties of purpose. To some Birds the air is almost their perpetual home—the only region in which they find their food—a region which they never leave, whether in storm or sunshine, except during the hours of darkness, and the yearly days which are devoted to their nests. Other Birds are mainly terrestrial, and never betake themselves to flight except to escape an enemy, or to follow the seasons and the sun. Between these extremes there is every possible variety of habit. And all these have corresponding varieties of structure. The Birds which seek their food in the air have long and powerful wings, and so nice an adjustment of their weight to that power and to that length, that the faculty of self-command in them is perfect, and their power of direction so accurate that they can pick up a flying gnat whilst they are passing through the air at the rate of more than a hundred miles an hour. Such especially are the powers of some species



THE SWIFT.

of the Swallow tribe, one of which, the common Swift, is a creature whose wonderful and unceasing evolutions seem part of the happiness of summer and of serene and lofty skies.*

There are other Birds in which the wing has to be adapted to the double purpose of swimming, or rather of diving, and of flight. In this case, a large area of wing must be dispensed with, because it would be incapable of being worked under water. Consequently in all diving Birds the wings are reduced to the smallest possible size which is consistent with retaining the power of flight at all; and in a few extreme Forms, the power of flight is sacrificed altogether, and the wing is reduced to the size, and adapted to the function, of a powerful fin. This is the condition of the Penguins. But in most genera of swimming Birds, both purposes are combined, and the wing is just so far reduced in size and stiffened in texture as to make it workable as a fin under water, whilst it is still just large enough to sustain the weight of the Bird in flight. And here again we have a wonderful example of the skill with which inexorable mechanical laws are subordinated to special purpose. It is a necessary consequence of the area of the wing being so reduced, in proportion to the size of the Bird, that great muscular power must be used in working it, otherwise the Force of Gravity could not be overcome at all. It is a farther consequence of this proportion of weight to working power, that there must be great momentum and therefore great velocity of flight. Accordingly this is the fact with all the oceanic diving Birds. They have vast distances to go, following shoals of fish, and moving from their summer to their winter haunts. They all fly with immense velocity, and the wing-strokes are extremely rapid. But there is one quality which their flight does not possess—because it is incompatible with their structure, and because it is not required by their habits—they have no facility in evolutions, no delicate power of steering; they cannot stop with ease, nor can they resume their onward motion in a moment. They do not want it: the trackless fields of ocean over which they roam are broad, and there are no obstructions in the way. They fly in straight lines, changing their direction

* For the form of the wing in this remarkable bird, see the beautiful drawing here engraved from the pencil of Mr. Wolf.

only in long curves, and lighting in the sea almost with a tumble and a splash. Their rising again is a work of great effort, and generally they have to eke out the resisting power of their small wings, not only by the most violent exertion, but by rising against the wind, so as to collect its force as a help and addition to their own.

And now, again, we may see all these conditions changed where there is a change in the purpose to be served. There is another large class of oceanic Birds whose feeding ground is not under water, but on the surface of the sea. In this class all those powers of flight which would be useless to the Divers are absolutely required, and are given in the highest perfection, by the enlistment of the same mechanical laws under different conditions. In the Gulls, the Terns, the Petrels, and in the Fulmars, with the Albatross as their typical Form, the mechanism of flight is carried through an ascending scale, to the highest degrees of power, both as respects endurance and facility of evolution.

The mechanical laws which are appealed to in all these modifications of structure require adjustments of the finest kind, and some of them are so curious and so beautiful that it is well worth following them a little further in detail.

There are two facts observable in all Birds of great and long-sustained powers of flight:—the first is, that they are always provided with wings which are rather long than broad, sometimes extremely narrow in proportion to their length; the second is, that the wings are always sharply pointed at the ends. Let us look at the mechanical laws which absolutely require this structure for the purpose of powerful flight, and to meet which it has accordingly been devised and provided.

One law appealed to in making wings rather long than broad is simply the law of leverage. But this law has to be applied under conditions of difficulty and complexity, which are not apparent at first sight. The body to be lifted is the very body that must exert the lifting power. The Force of Gravity, which has to be resisted, may be said to be sitting side by side, occupying the same particles of matter, with the Vital Force which is to give it battle. Nay, more, the one is connected with the other in some mysterious manner which we cannot trace or un-

derstand. A dead Bird weighs as much as a living one. Nothing which our scales can measure is lost when the Vital Force is gone. It is The Great Imponderable. Nevertheless, vital forces of unusual power are always coupled with unusual mass and volume in the matter through which they work. And so it is that a powerful Bird must always also be comparatively a heavy Bird. And then it is to be remembered that the action of gravity is constant and untiring. The Vital Force, on the contrary, however intense it may be, is intermitting and capable of exhaustion. If, then, this Force is to be set against the Force of Gravity, it has much need of some implement through which it may exert itself with mechanical advantage as regards the particular purpose to be attained. Such an implement is the lever—and a long wing is nothing but a long lever. The mechanical principle, or law, as is well known, is this,—that a very small amount of motion, or motion through a very small space, at the short end of a lever, produces a great amount of motion, or motion through a long space, at the opposite or longer end. This action requires indeed a very intense force to be applied at the shorter end, but it applies that force with immense advantage for the purpose in view: because the motion which is transmitted to the end of a long wing is a motion acting at that point through a long space, and is therefore equivalent to a very heavy weight lifted through a short space at the end which is attached to the body of the Bird. Now this is precisely what is required for the purpose of flight. The body of a Bird does not require to be much lifted by each stroke of the wing. It only requires to be sustained; and when more than this is needed—as when a Bird first rises from the ground or from the sea, or when it ascends rapidly in the air—greatly increased exertion—in many cases, very violent exertion—is required.* And then it is to be remembered that long wings economize the vital force in another way. When a strong current of air strikes against the wings of a Bird, the same sustain-

* The Albatross, when rising from the sea, is described ("Ibis," July, 1865) as "stretching out his neck, and with great exertion of his wings, running along the top of the water for seventy or eighty yards, until at last having got sufficient impetus, he tucks up his legs, and is once more fairly launched into the air." The contrast here described between the violent exertion required in first rising, and the perfect ease of flight after this first momentum has been acquired, is a striking illustration of the true mechanical principles of flight.

ing effect is produced as when the wing strikes against the air. Consequently Birds with very long wings have this great advantage, that with pre-acquired momentum, they can often for a long time fly without flapping their wings at all. Under these circumstances, a Bird is sustained very much as a boy's kite is sustained in the air. The string which the boy holds, and by which he pulls the kite downwards with a certain force, performs for the kite the same offices which its own weight and balance and momentum perform for the Bird. The great long-winged oceanic Birds often appear to float rather than to fly. The stronger is the gale, their flight, though less rapid, is all the more easy—so easy indeed as to appear buoyant, because the blasts which strike against their wings are enough to sustain the bird with comparatively little exertion of its own, except that of holding the wing vanes stretched and exposed at proper angles to the wind. And whenever the onward force previously acquired by flapping becomes at length exhausted, and the ceaseless inexorable Force of Gravity is beginning to overcome it, the Bird again rises by a few easy and gentle half-strokes of the wing. Very often the same effect is produced by allowing the Force of Gravity to act, and when the downward momentum has brought the Bird close to the ground or to the sea, that force is again converted into an ascending impetus by a change in the angle at which the wing is exposed to the wind. This is a constant action with all the oceanic Birds. Those who have seen the Albatross have described themselves as never tired of watching its glorious and triumphant motion:—

> "Tranquil its spirit seemed, and floated slow;
> Even in its very motion there was rest."
>
> "*A Cloud*," PROF. WILSON.

Rest—where there is nothing else at rest in the tremendous turmoil of its own stormy seas! Sometimes for a whole hour together this splendid Bird will sail or wheel round a ship in every possible variety of direction without requiring to give a single stroke to its pinions. Now, the Albatross has the extreme form of this kind of wing. Its wings are immensely long—about fourteen or fifteen feet from tip to tip—and almost as

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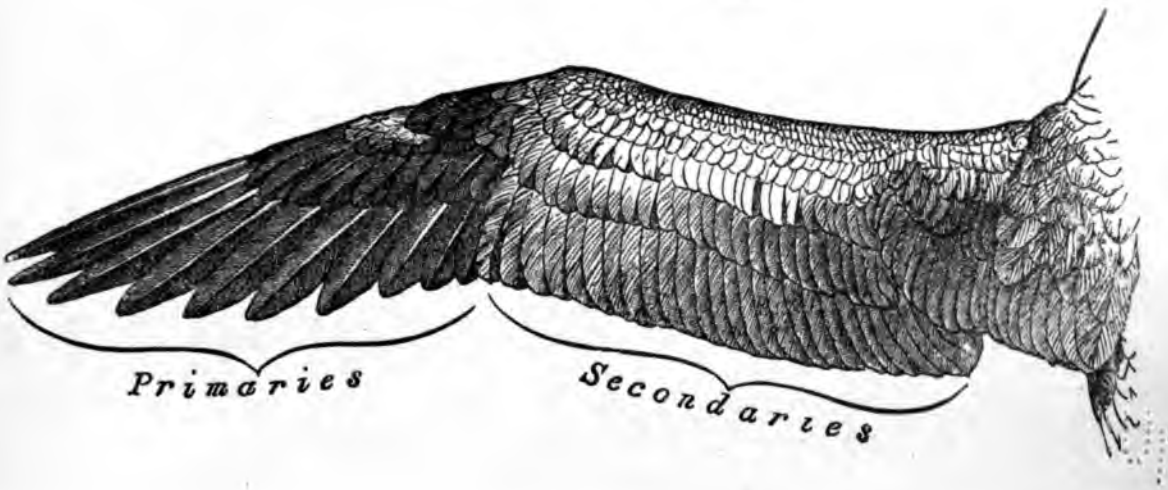


WING OF GANNET.

narrow in proportion as a ribbon.* Our common Gannet is an excellent, though a more modified, example of the same kind of structure. On the other hand, Birds of short wings, though their flight is sometimes very fast, are never able to sustain it very long. The muscular exertion they require is greater, because it does not work to the same advantage. Most of the Gallinaceous Birds (such as the common Fowl, Pheasants, Partridges, etc.) have wings of this kind; and some of them never fly except to escape an enemy, or to change their feeding-ground.

The second fact observable in reference to Birds of easy and powerful flight—namely, that their wings are all sharply pointed at the end—will lead us still further into the niceties of adjustment which are so signally displayed in the machinery of flight.

The feathers of a Bird's wing have a natural threefold division, according to the different wing-bones to which they are attached. The quills which form the end of the wing are called the Primaries; those which form the middle of the vane are called the Secondaries; and those which are next the body of the Bird are called the Tertiaries. The motion of a Bird's wing increases from its minimum at the shoulder-joint to its maximum at the tip. The primary quills which form the termination of the wing are those on which the chief burden of flight is cast. Each feather has less and less weight to bear, and less and less force to exert, in proportion as it lies nearer the body of the bird; and there is nothing more beautiful in the structure of a wing than the perfect gradation in strength and stiffness, as well as in modification of form, which marks the series from the first of the Primary quills to the last and feeblest of the Tertiaries.† Now, the sharpness or roundness of a wing

* The mechanical principle involved in the sufficiency of very narrow wings has, I believe, been adequately explained in a very ingenious paper read before the *Aëronautical Society*, by Mr. F. H. Wenham, C.E. It is the same mechanical principle which accounts for the narrow blades of a Screw Propeller having a resisting force as great as would be exerted upon the whole area of rotation by a solid Disc. In the case of a flat body, such as the wing of a bird, being propelled edgeways through the air, nearly the whole resisting and sustaining force is exerted upon the first few inches of the advancing surface.

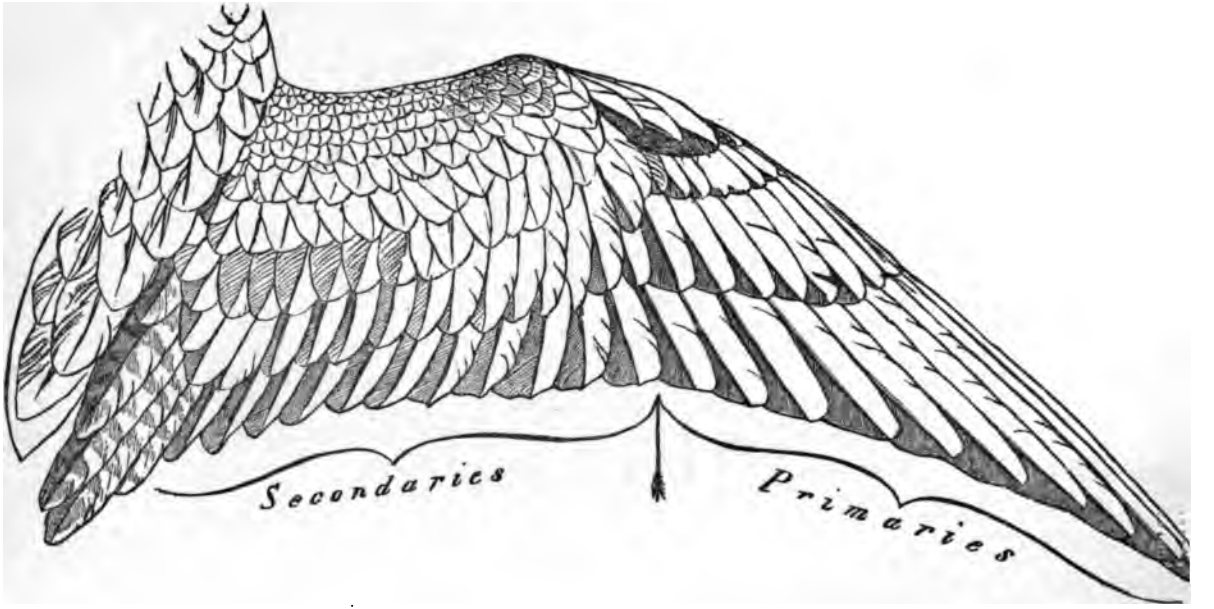
† I owe to the accurate pencil of Mr. J. Wolf the accompanying engraving of the wing of the Golden Plover, a Bird of powerful flight. In this wing the gradation of the feathers is very perfect. It will be observed that the first of the Secondaries, the eleventh feather from the tip of the wing, is marked by a slight variation in the form of the margin.

at the tip depends on the position which is given to the *longest* Primary quill. If the first, or even the second, primary is the longest, and all that follow are considerably shorter, the wing is necessarily a pointed wing, because the tip of a single quill forms the end; but if the third or fourth Primary quills are the longest, and the next again on both sides are only a little shorter, the wing becomes a round-ended wing. Round-ended wings are also almost always open-ended—that is to say, the tips of the quills do not touch each other, but leave interspaces at the end of the wing, through which, of course, a good deal of air escapes. Since each single quill is formed on the same principle as the whole wing—that is, with the anterior margin stiff and the posterior margin yielding—this escape is not useless for progression; but the air acts less favorably for this purpose than when struck by a more compact set of feathers. The common Rook and all the Crows are examples of this. The Peregrine Falcon, the common Swallow, and all Birds of very powerful flight, have been provided with the sharp-pointed structure.*

The object of this structure, and the mechanical laws to which it appeals, will be apparent when we recollect what it is on which the propelling power, as distinct from the sustaining power, of a Bird's wing depends. It depends on the reaction of the air escaping *backwards*—that is, in the direction exactly opposite to that of the intended motion of the Bird. Any air which escapes from under the wing, in any other direction, will of course react with less advantage upon that motion. But from under a round wing a good deal of air must necessarily escape *along the rounded end*—that is, in a direction at right angles to the line of intended flight. All the reaction produced by this escape is a reaction which is useless for propulsion. Accordingly, in all Birds to which great velocity of flight is essential, this structure, which is common in other Birds, is carefully avoided.

The Hawks have been classified as "noble" or "ignoble," according to the length and sharpness of their wings: those which catch their prey by velocity of flight having been uni-

* The illustrations of Mr. Wolf will here again be the best explanation to the reader of the difference between the sharp and the round structure, p. 93.



WING OF GOLDEN PLOVER.

formly provided with the long-pointed structure. The Sparrow-Hawk and the Merlin are excellent examples of the difference. The Sparrow-Hawk, with its comparatively short and blunt wings, steals along the hedgerows and pounces on its prey by surprise; seldom chasing it, except for a short distance, and when the victim is at a disadvantage. And well do the smaller Birds know this habit, and the limit of his powers. Many of them chase and "chaff" the Sparrow-Hawk, when he is seen flying in the open, perfectly aware that he cannot catch them by fast flying. But they never play these tricks with the Merlin. This beautiful little Falcon hunts the open ground, giving fair chase to its quarry by power and speed of flight. The Merlin delights in flying at some of the fastest Birds, such as the Snipe. The longest and most beautiful trial of wingmanship I have ever seen was the chase of a Merlin after a Snipe in one of the Hebrides. It lasted as far as the eye could reach, and seemed to continue far out to sea. In the Merlin, as in all the fastest Falcons, the second quill feather is the longest in the wing; the others rapidly diminish; and the point of the wing looks as sharp as a needle in the air.

There is yet one other power which it is absolutely necessary to some Birds that their wings should enable them to exert: and that is, the power of standing still, or remaining suspended in the air without any forward motion. One familiar example of this is the common Kestrel, which, from the frequent exercise of this power, is called in some counties the "Windhover." The mechanical principles on which the machinery of flight is adapted to this purpose, are very simple. No Bird can exercise this power which is not provided with wings large enough, long enough, and powerful enough to sustain its weight with ease, and without violent exertion. Large wings can always be diminished at the pleasure of the Bird, by being partially folded inwards; and this contraction of the area is constantly resorted to. But a Bird which has wings so small and scanty as to compel it to strike them always at full stretch, and with great velocity in order to fly at all, is incapable of standing still in the air. No man ever saw a Diver or a Duck performing the evolution which the Kestrel may be seen performing every hour over so many English fields. The cause of this is obvious, if we re-

fer to the principles which have already been explained. We have seen that the perpendicular stroke of a Bird's wing has the double effect of both propelling and sustaining. The reaction from such a stroke brings two different forces to bear upon the Bird—one whose direction is upwards, and another whose direction is forwards. How can these two effects be separated from each other? How can the wing be so moved as to keep up just enough of the sustaining force without allowing the propelling force to come into play? The answer to this, although it involves some very complicated laws connected with what mechanicians call the "parallelogram of forces," is practically a simple one. It can only be done by shortening the stroke and altering the perpendicularity of its direction. Of course, if a Bird, by altering the axis of its own body, can direct its wing-stroke in some degree *forwards*, it will have the effect of stopping instead of promoting progression. But in order to do this, it must have a superabundance of sustaining force, because some of this force is sacrificed when the stroke is off the perpendicular. Hence it follows that Birds so heavy as to require the whole action of their wings to sustain them at all, can never afford this sacrifice of the sustaining force, and, except for the purpose of arresting their flight, can never strike except directly downwards,—that is, directly against the opposing force of gravity. But Birds with superabundant sustaining power, and long sharp wings, have nothing to do but to diminish the length of stroke, and direct it off the perpendicular at such an angle as will bring all the forces bearing upon their body to an exact balance, and they will then remain stationary at a fixed point in the air.*

They are greatly assisted in this beautiful evolution by an adverse current of air; and it will always be observed that the Kestrel, when hovering, turns *his head to wind*, and hangs his whole body at a greater or less angle to the plane of the horizon. When there is no wind, or very little, the sustaining force is kept up by a short rapid action of the pinions, and the long tail is spread out like a fan to assist in stopping any tendency to onward motion. When there is a strong breeze, no flapping

* Mr. Wolf's illustration of a Kestrel hovering shows accurately the position of the bird when the action is performed in still air.

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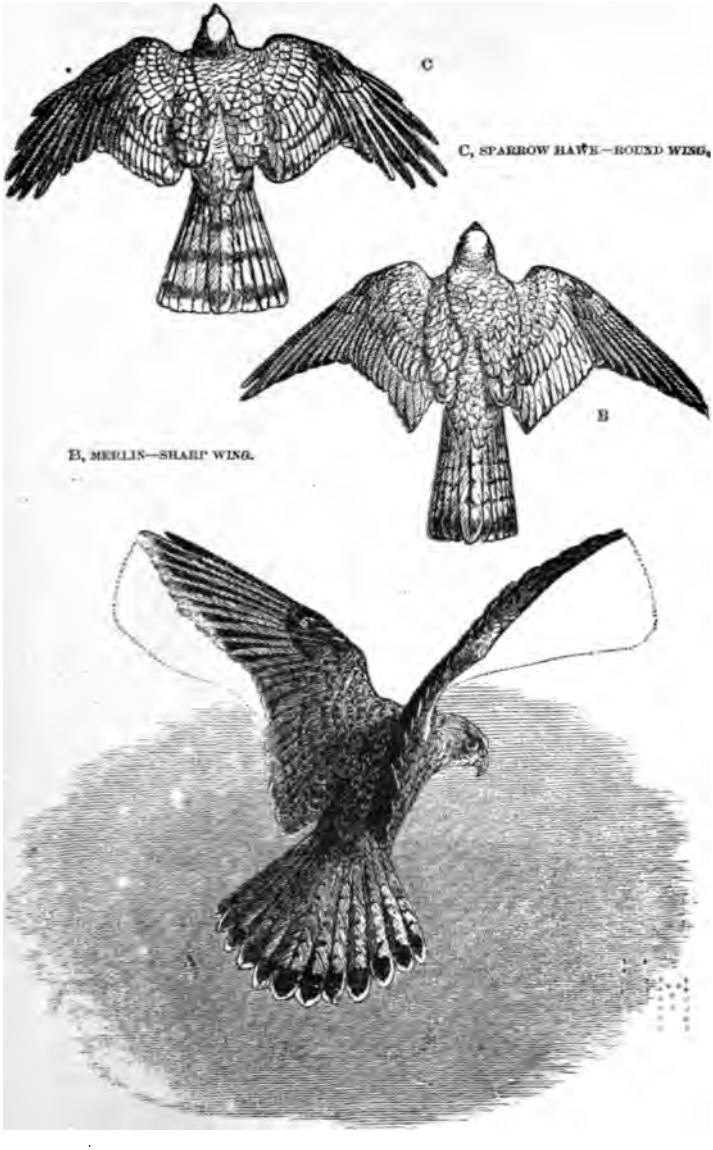

C, SPARROW HAWK—ROUND WING.

B, MERLIN—SHARP WING.

A, KESTREL HOVERING.

is required at all—the force of the wind supplying the whole force necessary to counteract the force of gravity; and in proportion to the increasing strength of the wind, the amount of vane which must be exposed to it becomes less and less. I have seen a Kestrel stand suspended in a half gale with the wings folded close to the body, and with no visible muscular motion whatever. And so nice is the adjustment of position which is requisite to produce this exact balance of all the forces bearing on the Bird, that the change in that position which again instantly results in a forward motion is very often almost insensible to the eye. It is generally a slight expansion of the wings, and a very slight change in the axis of the body.

And here it may be observed that the tails of Birds have not, as is often supposed, any function analogous to the rudder of a ship. Birds which have lost the tail are not thereby rendered incapable of turning. If the steering function had been assigned to Birds' tails, the vane of the tail must have been set, not, as it is, horizontally, but perpendicularly to the line of flight. But a Bird's tail has in flight no lateral motion whatever. It does, indeed, materially assist the Bird in turning, because it serves to *stop the way* of a Bird when it rises or turns in the air to take a new direction. The feathers of the tail are also capable of being depressed unequally,—that is, more at one side than at the other; and when the whole are spread out like the leaves of a fan, this depression at one side is a means whereby the Bird can exert against the air which is passing under it greater muscular pressure upon one side than upon the other, and can thus help the turning action of the wings. With a telescope I have seen this action of the tail very marked in the soaring flight of the Buzzard, when the Bird is wheeling round in spiral circles. The tail contributes also largely to the general balance of the body, which in itself is an important element in the facility of flight. Accordingly, almost all Birds which depend on great ease of evolution in flight—or on the power of stopping suddenly, have largely developed tails. This is the case with all the Birds of prey—with the Kestrel in a conspicuous degree. But there are some exceptions which show that great powers of flight are not always dependent on the possession of a large tail—as, for example, the Swift.

Another explanation has been given of the means by which Birds are able to turn in flight, which is a curious example how preconceived theories founded on false analogies will vitiate our observation of the commonest facts in nature. I do not know of any modern work that gives any account of the theory of flight, which is even tolerably correct. But in most points an admirable account is to be found in the celebrated work of Borelli, "De Motu Animalium." On the question, however, of steerage in flight, he gives a solution which the most ordinary observation is sufficient to contradict. Borelli is quite aware that the tail in Birds has no such function as that which is usually assigned to it, and he points out the true theoretical objection to the possibility of its having any guiding power—viz., its horizontal position, and its immobility in the lateral direction. But the theory which he himself propounds is equally erroneous. It is this,—that Birds deflect their course to the right or to the left, as rowers turn a row-boat—by striking more quickly and more strongly with one wing than with the other.* To this theory there are two objections—first, that as matter of fact Birds can turn, and do turn, even to the extent of describing complete circles in the air, without any flapping either of one wing or the other: and secondly, that when Birds do flap and turn at the same time, not the slightest difference in time between the two wing-strokes can ever be detected. The beats of a Bird's two wings are always exactly synchronous. But the first of these two objections is of itself quite sufficient to disprove the theory. No man can have watched even for a moment the flight of the common Swallow, and especially the flight of the Swift, without seeing it perform complete gyrations in the air without any strokes of either wing. The only change which can ever be detected by the eye is a slight elevation on one side of the whole body, and a slight depression of the other. The depression is always on that side

* Referring to a boat, he says:—"Si remi dexteri lateris celerius quam sinistri aquam retrorsum impellant—semper prora revolvetur versus sinistrum latus; ergo eodem modo dum avis in medio fluido aeris innatat, volando æquilibrata in centro gravitatis ejus, si sola dextra ala deorsum sed oblique flactatur, aerem subjectum impellando versus caudam necessario ad instar navis mox memoratæ, permovetur latus ejus dextrum, quiescente aut tardius moto sinistro latera. Ex quo fit, ut avis pars anterior circa centrum gravitatis ejus revoluta, flectatur versum sinistrum latus."—Borellus, "De Motu Animalium," Pars Prima. Propositio cxcix.

towards which the Bird is turning. On the opposite side, that from which the Bird is turning, there is of course a corresponding elevation. Sometimes this is very obvious; but in general it is so slight as to require close observation to detect it. In the Albatross, when sweeping round, the wings are often pointed in a direction nearly perpendicular to the sea.* The effect of this, of course, is to expose the two vanes at different angles to the aërial currents—and it must be remembered that in flight the balance of all the forces employed is so extremely fine that the most minute alteration in the degree in which they bear upon each other will produce an immense change in the result. It is not surprising, therefore, that the muscular movements which serve to turn the axis of a flying Bird from one direction to another, are very often so extremely minute as generally altogether to elude the sight. But in general terms, it may be said that a Bird turns in flying essentially on the same principle as that on which a Man turns in walking. It is done in both cases by change in the direction of muscular pressure upon a resisting medium. By an exquisite combination of different laws, and by mechanical contrivance in the adjustment of them, it has been given to a Bird to find in the thin and yielding air a medium of resistance against which its own muscular force may act, as firm and as effective as that which Man finds in the solid earth.

The Humming Birds are perhaps the most remarkable examples in the world of the machinery of flight. The power of poising themselves in the air,—remaining absolutely stationary whilst they search the blossoms for insects,—is a power essential to their life. It is a power accordingly which is enjoyed by them in the highest perfection. When they intend progressive flight, it is effected with such velocity as to elude the eye. The action of the wing in all these cases is far too rapid to enable the observer to detect the exact difference between that

*See a very interesting account of the flight of the Albatross by Captain T. W. Hutton, in the "Ibis" for July, 1864. Captain Hutton says: "If he wishes to turn *to the right*, he bends his head and tail slightly upwards, at the same time *raising his left side and lowering the right* in proportion to the sharpness of the curve he wishes to make, the wings being kept rigid the whole time." This is the only paper I have seen on the flight of birds in which observation of the facts is not vitiated by some false preconceived theory on their cause. Captain Hutton has thoroughly seized the true mechanical principles of flight.

kind of motion which keeps the Bird at absolute rest in the air, and that which carries it along with such immense velocity. But there can be no doubt that the change is one from a short quick stroke delivered obliquely forward, to a full stroke, more slow, but delivered perpendicularly. This corresponds with the account given by that most accurate ornithological observer, Mr. Gould. He says: "When poised before any object, this action of the wing is so rapidly performed that it is impossible for the eye to follow each stroke, and a hazy semicircle of indistinctness on each side of the Bird is all that is perceptible." There is another fact mentioned by those who have watched their movements most closely which corresponds with the explanation already given—viz., the fact that the axis of the Humming Bird's body when hovering is always *highly inclined*, so much so as to appear almost perpendicular in the air. In other words the wing-stroke, instead of being delivered perpendicularly downwards, which would infallibly carry the body onwards, is delivered at such an angle forwards as to bring to an exact balance the upward, the downward, and the forward forces which bear upon the body of the Bird. Mr. Darwin says, "When hovering by a flower, the tail is constantly shut and expanded like a fan, *the body being kept in a nearly vertical position.*" Mr. Wallace, another accurate observer, describes the Humming Birds as "balancing themselves vertically in the air."

These are a few, and a few only, of the adjustments required in order to the giving of the power of flight;—adjustments of organic growth to intensity of vital force—of external structure to external work—of shape in each separate feather to definite shape in the series as a whole—of material to resistance—of mass and form to required velocities; adjustments, in short, of law to law, of force to force, and of all to Purpose. So many are these contrivances, so various, so fine, so intricate, that a volume might be written without exhausting the beauty of the method in which this one mechanical problem has been solved. It is by knowledge of unchanging laws that these victories over them seem to be achieved; yet not by knowledge only, except as the guide of Power. For here as everywhere else in Nature, we see the same mysterious need of conforming to imperative

conditions, side by side with absolute control over the forces through which this conformity is secured. When any given purpose cannot be attained without the violation of some law, unless by some new power, and some new machinery—the requisite power and mechanism are evolved generally out of old materials, and by modifications of pre-existing forms. There can be no better example of this than a wing-feather. It is a production wholly unlike any other animal growth—an implement specially formed to combine strength with lightness, elasticity, and imperviousness to air. Again, the bones of a Bird's wing are the bones of the Mammalian arm and hand, specially modified to support the feathers. The same purpose is effected by other means in connection with precisely the same bones in the flying Mammalia—the Bats. In these animals the finger-bones instead of being compressed or soldered together to support feathers, are separated, attenuated, and greatly lengthened to afford attachment to a web or flying membrane which is stretched between them. In other ages of the world there were also flying Lizards. But in all these cases the mechanical principle is the same, and there has been the same ingenious adaptation of material and of force to the universal laws of motion.

On the earth and on the sea Man has attained to powers of locomotion with which, in strength, endurance, and in velocity, no animal movement can compare. But the air is an element on which he cannot travel—an ocean which he cannot navigate. The Birds of heaven are still his envy, and on the paths they tread he cannot follow. As yet! for it is not certain that this exclusion is to be perpetual. His failure has resulted quite as much from his ignorance of natural laws, as from his inability to meet the conditions which they demand. All attempts to guide bodies buoyant in the air must be fruitless. Balloons are mere toys. No flying animal has ever been formed on the principle of buoyancy. Birds and Bats, and Dragons, have been all immensely heavier than the air, and their weight is one of the forces most essential to their flight. Yet there is a real impediment in the way of Man navigating the air—and that is the excessive weight of the only great mechanical moving powers hitherto placed at his disposal. When Science shall have

discovered some moving power greatly lighter than any we yet know, in all probability the problem will be solved.* But of one thing we may be sure—that if Man is ever destined to navigate the air, it will be in machines formed in strict obedience to the mechanical laws which have been employed by the Creator for the same purpose in flying animals.†

* The men of Science in France are ahead of the men of Science in England upon this subject. There is a society established in Paris which announces in its very title the true fundamental principle of flight—"Société d'Encouragement pour la Locomotion aérienne au moyen d'Appareils PLUS LOURDS que l'Air." The false principle of Buoyancy is thus eliminated and banished from the question.

† I owe to my father (John, 7th Duke of Argyll) my knowledge of the Theory of Flight which is expounded in this chapter. The retired life he led, and the dislike he had of the work of literary composition, confined the knowledge of his views within a comparatively narrow circle. But his love of mechanical science, and his study of the problem during many years of investigation and experiment, made him thoroughly master of the subject. In his devices for testing and illustrating the truth of his Theory, he was chiefly assisted by two very ingenious men, the late Mr. John Hart, of Glasgow, and the late Mr. Robert Bryson, of Edinburgh. The result of his investigations led him to the opinion that until a lighter moving power than steam is discovered, it will be impossible to construct successfully machines for the navigation of the air. I shall only add, that having made ornithology a favorite pursuit, I have been led during many years to test this theory by close observation of the flight of Birds; and that from the manner in which it fits into, and explains all the facts, I have been always more and more satisfied of its truth.

CHAPTER IV.

APPARENT EXCEPTIONS TO THE SUPREMACY OF PURPOSE.

YET, as we look at Nature, the fact will force itself upon us that there are structures in which we cannot recognize any use; that there are contrivances which often fail of their effect; and that there are others which appear to be separated from the conditions they were intended to meet, and under which alone their usefulness could arise. Such instances occur in many branches of inquiry; and although in the great mass of natural phenomena the supremacy of Purpose is evident enough, such cases do frequently come across our path as cases of exception—cases in which Law does not seem to be subservient to Will, but to be asserting a power and an endurance of its own.

The degree of importance which may be attached to such cases as a source of real difficulty, will vary with the character of the individual mind, and its capacity of holding by the great lines of evidence which run through the whole Order of Nature. It is with these cases as with the local currents which sometimes obscure the rising and falling of the tides. When watched from hour to hour, the greater law is clearly discernible by well-marked effects; but when watched from minute to minute, that law is not distinct, and there are waves which seem like a rebellion of the sea against the force which is dragging it from the land. The Order of Nature is very complicated, and very partially understood. It is to be expected therefore that there should be a vast variety of subordinate facts, whose relation to each other and to the whole must be a matter of perplexity to us. It is so with the relation in which different known laws of Nature stand to each other; much more must it be so with the far deeper subject of the relation which these laws bear to the Will and the intentions of the Supreme.

But as cases of intention frustrated, of structure without apparent purpose, of organs dissociated from function and from the opportunities of use, are sometimes sources of difficulty, it may be well to consider this subject a little nearer. Let us look at it both in the light of abstract reasoning, and also in the light of particular illustration.

In the first place, then, we must remember that results which may appear as exceptions to the attainment of one Purpose may be nothing more than fulfilments of another. This follows from the truth which has been dealt with in a former page,* that we are "greatly ignorant," as Bishop Butler says, how far anything in Nature is to be regarded as a means or as an end, and that ultimate or final purposes we can never see. The difficulty hence arising has often been represented as a fundamental objection to the whole doctrine of Intention. But this view is founded on a very great, although a very natural confusion of thought. The perception of Purpose and Intention is inseparable from the perception of Adjustment and Function as these are exhibited in Nature. As such it belongs to Knowledge. It is the perception of a relation between those phenomena and certain well known phenomena of Mind. But to perceive a relation is not necessarily to perceive all that this relation involves. To perceive intention is a very different thing from perceiving all that is intended. Our own human experience should make this distinction familiar to us. Many things we do and many things we contrive are done and contrived with more than one intention. In the light of this experience it is altogether irrational to regard as an exception to the attainment of Purpose in Nature the fact, for example, "that of fifty seeds she often brings but one to bear." It throws no doubt or difficulty in the way of our conviction, for example, that one purpose of seed-bearing in Plants is the reproduction of their kind, because it appears that another purpose to which that seed-bearing is applied is the support of animal life. The intention with which a grain of wheat is so constituted as to be capable of producing another wheat plant, is not the less in the nature of Purpose because it co-exists with another intention, that the same grain should be capable

* *Ante*, p. 48.

of sustaining the powers and the enjoyments of Life in the Body and in the Mind of Man. On the contrary, the power possessed by most plants, and by this plant especially, of producing seed in a ratio far beyond that which would be required for one purpose, is the sure indication and the proof that another purpose larger and wider was in view. Yet the seeds of corn which, as seeds, are destroyed when they are converted into bread, may in that aspect be represented and regarded as "failures." In reference to this kind of failure, it has been actually argued that in Nature "the prodigality of waste is far more conspicuous than the wise economy of which so much is said." * When applied to the case of the wheat plant the fallacy is apparent, and would probably be admitted. But this is only one example of a class to which an infinite number of other examples in Nature may be referred. There may be, indeed, and there are, innumerable examples where the meaning of like "failures" is not equally evident to us—some which may be involved in utter and hopeless darkness—some which may run up into the great master difficulty—that which we are accustomed to call the "Origin of Evil." But the same argument applies to all. It is not that Purpose and Intention solve all difficulties. But it is that no difficulty in perceiving what may be the purpose and intention of a particular fact can affect the reality and truth of that perception in other cases where no such difficulty exists. Let us now look at the same subject in the light of particular examples.

There is one explanation which, it cannot be doubted, applies to many cases; and this is, the simple explanation that we often mistake the purpose of particular structures in Nature, and connect them with intentions which are not, and never were, the intentions really in view. The best naturalists are liable to such mistakes. A very curious illustration is afforded by an observation of Mr. Darwin, in his "Origin of Species." He says that "if green Woodpeckers alone had existed, and we did not know that there were any black and pied kinds, I daresay we should have thought that the green color was a beautiful adaptation to hide this tree-frequenting bird from its enemies." Now, this introduces us to a very curious subject,

* Mr. G. H. Lewes, *Fortnightly Review*, July, 1867, p. 100.

and one as well adapted as any other to illustrate the relation in which Law stands to Purpose in the economy of Nature.

There can be no doubt that the principle of adapted coloring with the effect and for the purpose of concealment, prevails extensively in various branches of the Animal Kingdom. It arises, probably, like all other phenomena, by way of Natural Consequence, out of some combination of forces which are the instruments employed. We have no knowledge what these forces are; but we can imagine them to be worked into a law of assimilation, founded on some such principle as that which photography has revealed. It is true that Man has not yet discovered any process by which the tints of Nature can be transferred, as the most delicate shades of light can be transferred, to surfaces artificially prepared to receive them. Such a process is, however, very probably within the reach even of human chemistry, and it is one which is certainly known in the laboratory of Nature. The Chameleon is the extreme case in which the effect of such a process is proverbially known. Many Fish exhibit it in a remarkable degree, changing color rapidly in harmony with the color of the water in which they swim, or of the bottom on which they lie. The law on which such changes depend is very obscure: but it appears to be a natural process, as constant as all other laws are—that is, constant whenever given conditions are brought together. It is possible that the effect may be due to a cause which is well known to be capable of producing somewhat analogous results. Even before the days of Jacob and of Laban, it seems to have been known that through the eyes of the female parent color can be determined in her young; and although this is certainly not the law which commonly determines color—operating as it does, so far as we know, seldom, and only in a small degree—it is quite conceivable that, under special conditions, it is capable of being worked as a great power in Nature. But, then, these conditions are not brought together except with a view to purpose. For now let us see how this law, whatever it may be, is regulated and applied.

One thing is certain: assimilated coloring is not applied universally; on the contrary, it is applied very partially. Is it, therefore, applied arbitrarily—at hap-hazard, or without refer-

ence to conditions in which we can trace a reason and a rule? Far from it. The rule appears to be this:—adaptive coloring, as a means of concealment, is never applied (1) to any animal whose habits do not expose it to special danger, or (2) to any animal which is sufficiently endowed with other more effective means of escape.

This is the higher Law of Purpose which governs the lesser law, whatever it may be, by which assimilative coloring is produced. Now, no man who had observed this higher law could ever fall into the error of supposing that the color of the Green Woodpecker was given to it as a means of concealment. Few Birds are so invisible as Woodpeckers, because their structure and habits give them other methods of escaping observation, which are most curious and effective. They have few natural enemies but Man; and when in danger of being seen by him, they slip and glide round the bole of a tree or bough on which they may be climbing, with a swift, silent, and cunning motion, and from behind that shelter, with nothing visible but their head, they keep a close watch upon the movements of the enemy. With such sleight of feet, there is no need of lazier methods of concealment.

Accordingly, in this family of Birds, the law of assimilation is withheld from application, and the most violent and strongly contrasted coloring prevails. Jet black, side by side with pure white, and the most brilliant crimsons, are common in the plumage of the Woodpeckers. No birds are more conspicuous in coloring, yet none are more seldom seen. The Green Woodpecker itself, with its yellow tints and crimson hood, contrasts strongly with the bark on which it climbs. The purpose of concealment being effected by other means, gives way to the purpose of beauty or of adornment in the disposition of colors. And in general the same rule applies to all Birds whose life is led among woods and forests. Comparatively inaccessible to Birds of prey, they exhibit every variety of tint, and the principle of invisibility from assimilated coloring is almost unknown.

It must always be remembered, that animals of prey are as much intended to capture their food, as their victims are intended to have some chances and facilities of escape. The purpose here is a double purpose—a purpose not in all cases

to preserve life, but to maintain its balance and due proportion. In order to effect this purpose, the means of aggression, and of defence, or of escape, must bear a definite relation to each other both in kind and in degree. When arboreal Birds leave their sheltering trees, they are exposed to the attacks of Hawks, but they have fair opportunities of retreating to their coverts again; and the upward spring of the disappointed Falcon in the air, when his quarry reaches the shelter of trees, tells how effective such a retreat is, and how completely it ends the chase. On the other hand, there is a great variety of Birds whose habitat is the open plain—the desert—the unprotected shore—the treeless moor—the stony mountain-top. These are the favorite hunting-grounds of the Eagles, and the Falcons, and the Hawks. There they have free scope for their great powers of wing, and uninterrupted range for their piercing powers of sight. And it must be remembered, that even the slowest of the Hawks can on such ground capture with ease Birds which, when once on the wing, could distance their pursuer by superior speed, because the Hawk, sweeping over the ground, takes the prey at a disadvantage, pouncing on it before it can get fairly into the air. Birds whose habitat is thus exposed could not maintain their existence at all without special means of concealment or escape. Accordingly it is among such Birds almost exclusively that the law of assimilative coloring prevails. And among them it is carried to a perfection which is wonderful indeed. Every ornithologist will recognize the truth of the observation, that this law prevails chiefly among the Grouse, the Partridges, the Plovers, the Snipes, Woodcocks, Sandpipers, and other kindred families, all of which inhabit open ground. There can be no better examples than the Grouse and the Ptarmigan of our Scottish mountains. The close imitation in the plumage of these Birds of the general tinting and mottling of the ground on which they lie and feed is apparent at a glance and is best known to those who have tried to see Grouse or Ptarmigan when sitting, and when their position is indicated within a few feet or a few inches by the trembling nostrils and dilated eyeballs of a steady Pointer-Dog. In the case of the common Grouse, as the ground is nearly uniform in color throughout the year, the coloring of the Bird is constant also.

But in the case of the Ptarmigan, it changes with the changing seasons. The pearly grays which in summer match so exactly with the lichens of the mountain peaks, give place in winter to the pure white which matches not less perfectly with the wreaths of snow.

This is indeed a change which requires for its production the agency of other laws than those merely of reflected light, because the substitution of one entire set of feathers for another of a different color, twice in every year, implies arrangements which lie deep in the organic chemistry of the Bird. The various genera of Sand-Grouse and Sand-Partridges which frequent the deserts and naked plains of the Asiatic continent, are colored in exquisite harmony with the ground. Our common Woodcock is another excellent example, and is all the more remarkable as there is one very peculiar color introduced into the plumage of this Bird which exactly corresponds with a particular stage in the decay of fallen leaves—I mean that in which the browns and yellows of the Autumn rot away into the pale ashy skeletons which lie in thousands under every wood in winter. This color is exactly reproduced in the feathers of the Woodcock, and so mingled with the dark browns and warm yellows of fresher leaves, that the general imitation of effect is perfect. And so curiously is the purpose of concealment worked out in the plumage of the Woodcock, that one conspicuous ornament of the bird is covered by a special provision from the too curious gaze of those for whose admiration it was not intended. The tail-feathers of the Woodcock can be erected and spread out at pleasure like a fan, and, being tipped on their under surface with white of a brilliant and silvery lustre, set off by contrast with an adjacent patch of velvety black, they then produce a most conspicuous effect. But the same web which on its under surface bears this beautiful but dangerous ornament, is on its upper surface dulled down to a sombre ashy-gray, and becomes as invisible as the rest of the plumage. These are all provisions of Nature, which stand in clear and intelligible relation to the habits of the Bird. It rests all day upon the ground, under trees; and were it not for its ingeniously adapted coloring, it would be peculiarly exposed to destruction. Man is an enemy whose cun-

ning inventions overcome all such methods of protection, and the Woodcock, when in his most rapid flight, is now an easier prey than in older times when sitting on the ground. But before fire-arms had reached the perfection which has enabled us to shoot flying Birds, the coloring of the Woodcock served it in good stead, even against the Lords of the Creation. In old times it required special skill and practice to see Woodcocks on the ground, and the large lustrous black eye which is adapted for night-vision was the one spot of color which enabled the fowler of a century and a half ago to detect the bird. Thus Hudibras has it :—

> "For fools are known by looking wise,
> As men find woodcocks by their eyes."
> "*Hudibras to Sidrophel*," 79, 80.

In Snipes, again, there is are markable series of straw-colored feathers introduced along the back and shoulders, which perfectly imitate the general effect of the bleached vegetable stalks common on the ground which the Bird frequents.

There are other animals in which the principle of imitation with a view to concealment is carried very much farther than the mere imitation of color, and extends also to form and structure. There are some examples of this in the Class of Insects, so remarkable that it is impossible to look at them without ever fresh astonishment. I refer to some families of the Orthopterous order, and especially to some genera of the *Mantidæ* and *Phasmidæ*. Many species of the genus *Mantis* are wholly modelled in the form of vegetable growths. The legs are made to imitate leaf-stalks, the body is elongated and notched so as to simulate a twig; the segment of the shoulders is spread out and flattened in the likeness of a seed-vessel; and the large wings are exact imitations of a full-blown leaf, with all its veins and skeleton complete, and all its color and apparent texture. There is something startling and almost horrible in the completeness of the deception—very horrible it must be to its hapless victims. For in this case the purpose of the imitation is a purpose of destruction, the *Mantis* being a predacious insect, armed with the most terrible weapons, hid under the peaceful forms of the vegetable world. It is the

habit of these creatures to sit upon the leaves which they so closely resemble, apparently motionless, but really advancing on their prey with a slow and insensible approach. Their structure disarms suspicion. Wonderful as this structure is, it would be none the less, but all the more wonderful, if it should arise by way of Natural Consequence from some law of development or of growth. It must be a law of which at present we have no knowledge, and can hardly form any conception. But certain it is that here, as in all other cases, the purpose which is actually attained, is attained by a special adaptation of ordinary structure to a special and extraordinary purpose. No new members are given to the *Mantis;* there is no departure from the plan on which all other Insects of the same Order are designed. The body has the same number of segments, the legs are the same in number, and are composed of the same joints; every part of this strange creature which seems like a bit of foliage animated with insect life, can be referred to its corresponding part in the ordinary anatomy of its Class. The whole effect is produced by a little elongation here, a little swelling there, a little dwarfing of one part, a little development of another. The most striking part of the whole imitation—that of the "nervation" of the leaf—is produced by a modification, not very violent, of a structure which belongs to all flying Insects. Their wings are constructed of a thin filmy material stretched upon a framework of stronger substance, as the sails of a windmill are stretched upon a trellis-work of spars. This framework is designed in a great variety of patterns—more elaborate and more beautiful than the tracery of Gothic windows. In the *Mantis* this tracery, instead of being drawn in a mere pattern, is drawn in imitation of the nervature of a leaf. And imitative coloring is added to imitative structure—so that nothing should be wanting to its completeness and success.

It must always be remembered, however, that Contrivance in Nature can never be reduced to a single purpose, and to that alone. Almost every example of it is connected with a number of effects which fit into each other in endless ramifications of adjustment. For example, this imitative structure of the *Mantidæ* serves as well for their own protection from in-

sectivorous birds as for the procuring of their food in the capture of other Insects. And this, which is perhaps the subordinate purpose in the case of the *Mantidæ*, emerges as the main purpose in another family of imitative Insects, the *Phasmidæ*. These last are vegetable feeders, and their imitative structure is, if possible, even more wonderful, as it certainly is more beautiful. In some species the wings are not only made like leaves in form, in structure, and in general color, but they are tinted at different seasons of the year with the varying colors of spring, of summer, or of autumn. The fundamental green is shaded off into browns, and reds, and yellows, with a few of those crimson touches which are so common in the "Pageant of the year." There is one specimen in the British Museum where the imitative effect is pursued, as it were, into a region of still more minute and curious observation. The general aspect of summer vegetation is much affected by the ravages of insect life. Minute larvæ eat into the cuticle of leaves, and mark them with various spots of bleached or faded color. Now the specimen of *Phasma* I refer to has its wing covered with spots which exactly imitate this appearance of a larva-eaten leaf. Can it be that this effect is itself produced by a really similar cause—the eating of some larval parasite into the tissue of the wing? If so, the combination of means to the production of so wonderful an effect becomes only the more bewildering in the endless vistas of adjustment which are opened out. And there is another fact connected with these Insects which is as astonishing as any other. It is this—that the idea and purpose of imitation is carried into effect consistently and perseveringly through all the stages of the creature's metamorphoses. The eggs are as perfect imitations of vegetable seeds as the adult insect is of the expanded leaf. In the larval form they are like bits of stalk, or chips or cuttings of leaves.

But although the laws which determine both form and coloring are here seen to be subservient to use, we shall never understand the phenomena of Nature unless we admit that mere ornament or beauty is in itself a purpose, an object, and an end. Mr. Darwin denies this; but he denies it under the strange impression, that to admit it would be absolutely fatal to

his own theory on the Origin of Species. So much the worse for his theory, if this incompatibility be true. There is indeed a difference, at least in words, between the doctrine now asserted and the doctrine which Mr. Darwin denies. What he denies as a purpose in nature is beauty "in the eyes of Man." But this evades the real point at issue. The relation in which natural beauty stands to Man's appreciation of it, is quite a separate question. It is certain enough that the gift of ornament in natural things has not been lavished, as it is lavished, for the mere admiration of mankind. Ornament was as universal—applied upon a scale at once as grand and as minute as now—during the long ages before Man was born. Some of the most beautiful forms in Nature are the shells of the marine Mollusca, and many of them are the richest, too, in surface ornament. But, prodigal of beauty as the Ocean now is in the creatures which it holds, its wealth was even greater and more abounding in times when there was no man to gather them. The shells and corals of the old Silurian Sea were as elaborate and as richly carved as those which we now admire: and the noble Ammonites of the Secondary ages must have been glorious things indeed. Even now there is abundant evidence that although Man was intended to admire beauty, beauty was not intended only for Man's admiration. Nowhere is ornament more richly given, nowhere is it seen more separate from use, than in those organisms of whose countless millions the microscope alone enables a few men for a few moments to see a few examples. There is no better illustration of this than a class of forms belonging to the border-land of animal and vegetable life called the *Diatomaceæ*, which, though invisible to the naked eye, play an important part in the economy of Nature. They exist almost everywhere, and of their remains whole strata, and even mountains, are in great part composed. They have shells of pure silex, and these, each after its own kind, are all covered with the most elaborate ornament—striated, or fluted, or punctured, or dotted in patterns which are mere patterns, but patterns of perfect, and sometimes of most complex, beauty. No graving done with the graver's tool can equal that work in gracefulness of design, or in delicacy and strength of touch. Yet it is impossible to look at

these forms—in all the variety which is often crowded under a single lens—without recognizing instinctively that the work of the graver is work strictly analogous,—addressed to the same perceptions,—founded on the same idea,—having for its object the same end and aim. And as the work of the graver varies for the mere sake of varying, so does the work on these microscopic shells. In the same drop of moisture there may be some dozen or twenty forms, each with its own distinctive pattern, all as constant as they are distinctive, yet having all apparently the same habits, and without any perceptible difference of function.

It would be to doubt the evidence of our senses and of our reason, or else to assume hypotheses of which there is no proof whatever, if we were to doubt that mere ornament, mere variety, are as much an end and aim in the workshop of Nature as they are known to be in the workshop of the goldsmith and the jeweller. Why should they not? The love and desire of these is universal in the mind of Man. It is seen not more distinctly in the highest forms of civilized art than in the habits of the rudest savage, who covers with elaborate carving the handle of his war-club, or the prow of his canoe. Is it likely that this universal aim and purpose of the mind of Man should be wholly without relation to the aims and purposes of his Creator? He that formed the eye to see beauty, shall He not see it? He that gave the human hand its cunning to work for beauty, shall His hand never work for it? How then, shall we account for all the beauty of the world—for the careful provision made for it where it is only the secondary object, not the first? Even in those cases, for example, where concealment is the main object in view, ornament is never forgotten, but lies as it were underneath, carried into effect under the conditions and limitations imposed by the higher law and the more special purpose. Thus the feathers of the Ptarmigan, though confined by the law of assimilative coloring to a mixture of black and white or gray, have those simple colors disposed in crescent bars and mottlings of beautiful form, even as the lichens which they imitate spread in radiating lines and semi-circular ripples over the weather-beaten stones. It is the same with all other Birds whose color is the color of their home. For the purpose of concealment, their coloring would be equally effective if it

were laid on without order or regularity of form. But this is never done. The required tints are always disposed in patterns, each varying with the genus and the species; varying for the mere sake of variation, and for the beauty which belongs to ornament. And where this purpose is not under the restraint of any other purpose controlling it and keeping it down as it were within comparatively narrow limits, how gorgeous are the results attained! What shall we say of flowers—those banners of the vegetable world, which march in such various and splendid triumph before the coming of its fruits? What shall we say of the Humming Birds—whose feathers are made to return the light which falls upon them, as if rekindled from intenser fires, and colored with more than all the colors of all the gems?

There is one instance in Nature (and, as far as I know, only one) in which ornament takes the form of pictorial representation. The secondary feathers in the wing of the Argus Pheasant are developed into long plumes, which the bird can erect and spread out like a fan, as a Peacock spreads his train. These feathers are decorated with a series of conspicuous spots or "eyes," which are so colored as to imitate the effect of balls. The shadows and the "high light" are placed exactly where an artist would place them in order to represent a sphere.* The "eyes" of the Peacock's train are wonderful examples of ornament; but they do not represent anything except their own harmonies of color. The "eyes" of the Argus Pheasant are like the "ball and socket" ornament which is common in the decorations of human art. It is no answer to this argument in respect to beauty, that we are constantly discovering the use of beautiful structures in which the beauty only, and not the usefulness, had been hitherto perceived. The harmonies on which all beauty probably depends are so minutely connected in Nature that "use" and ornament may often both arise out of the same conditions. Thus, some of the most beautiful lines on the surface of shells are simply the lines of their annual growth, which growth has followed definite curves, and it is the "law" of these curves that is beautiful in our eyes. Again, the forms

* I owe the observation of this curious fact to my friend Mr. James Nasmyth, so well known as the inventor of the Steam Hammer, and as a distinguished astronomer.

of many Fish which are so beautiful, are also forms founded on the lines of least resistance. The same observation applies to the form of the bodies and of the wings of Birds. Throughout Nature, ornament is perpetually the result of conditions and arrangements fitted to use and contrived for the discharge of function. But the same principle applies to human art, and few persons are probably aware how many of the mere ornaments of architecture are the traditional representation of parts which had their origin in essential structure. Yet who would argue from this fact that ornament is not a special aim in the works of Man? When the savage carves the handle of his war-club, the immediate purpose of his carving is to give his own hand a firmer hold. But any shapeless scratches would be enough for this. When he carves it in an elaborate pattern, he does so for the love of ornament, and to satisfy the sense of beauty.

There is, however, another department of natural phenomena which, much more than the one we have been now considering, does at first sight suggest to the mind the subordination of Purpose and the supremacy of Law. Is is the department of Comparative Anatomy. It is a fact now well known and universally accepted, that in many animal structures, perhaps in all except one, there are parts the presence of which cannot be explained, from their serving any immediate use, or discharging any actual function. For example, the limbs of all the Mammalia, and even of all the Lizards, terminate in five jointed bones or fingers. But in many animals the whole five are not needed, but only some one, or two, or three. In such cases the remainder are indeed dwarfed, sometimes almost extinguished; but the curious fact is that rudimentally the whole number are always to be traced. Even in the Horse, where one only of the five is directly used, and where this one is enlarged and developed into a hoof, parts corresponding to the remaining four fingers can be detected in the anatomy of the limb. Other examples of the same principle might be given without number. Thus there are Monkeys which have no thumbs for use, but only thumb-bones hid beneath the skin: the wingless Bird of New Zealand, the "Apteryx," has useless wing-bones similarly placed; snakes destined always to creep

"upon their belly" have nevertheless rudiments of legs, and the common "Slowworm" has even the "blade bone" and "collar bone" of rudimentary or aborted limbs: the Narwhal has only one tusk, on the left side, developed for use, like the horn of an heraldic Unicorn, but the other tusk, on the right side, is present as a useless germ: the female Narwhal has both tusks reduced to the same unserviceable condition: young whalebone Whales are born with teeth which never cut the gum, and which are afterwards absorbed as entirely useless to the creature's life.

At first sight it may appear as if these were facts not to be reconciled with the supremacy of Purpose:—at first sight, but at first sight only. For as we look at them and wonder at them, and set ourselves to discover how many of a like nature can be found, our eye catches sight of an Order which had not been at first perceived. Exceptions to one narrow rule such as we might have laid down and followed for ourselves, they are now seen to be in strict subordination to a larger rule which it would never have entered into our imagination to conceive. These useless members, these rudimentary or aborted limbs which puzzled us so much, are parts of an universal Plan. On this plan the bony skeletons of all living animals have been put together. The forces which have been combined for the moulding of Organic Forms have been so combined as to mould them after certain types or patterns. And when Comparative Anatomy has revealed this fact as affecting all the animals of the existing world, another branch of the same science comes in to conform the generalization, and extend it over the innumerable creatures which have existed and have passed away. This one Plan of Organic Life has never been departed from since Time began.

When we have grasped this great fact, all the lesser facts which are subordinate to it assume a new significance. In the first place a Plan of this kind is in itself a Purpose. An Order so vast as this, including within itself such variety of detail, and maintained through such periods of Time, implies combination and adjustment founded upon, and carrying into effect, one vast conception. It is only as an Order of Thought that the doctrine of Animal Homologies is intelligible at all. It is a

Mental Order, and can only be mentally perceived. For what do we mean when we say that this bone in one kind of animal corresponds to such another bone in another kind of animal? Corresponds—in what sense? Not in the method of using it—for very often limbs which are homologically the same are put to the most diverse and opposite uses. To what standard, then, are we referring when we say that such and such two limbs are homologically the same? It is to the standard of an Ideal Order—a Plan—a Type—a Pattern mentally conceived. This sounds very recondite and metaphysical; and yet the habit of referring physical facts to some ideal standard and order of thought is a universal instinct in the human mind. It is one of the earliest of our efforts in endeavoring to understand the phenomena around us. The science of Homologies, as developed by Cuvier and Hunter and Owen and Huxley, is indeed an intricate, almost a transcendental science. Yet Dr. Livingstone found the natives of Africa debating a question which belongs essentially to that science and involves the whole principle of the mental process by which it is pursued. The debate was on the question "whether the two toes of the Ostrich represent the thumb and forefinger in Man, or the little and ring-finger."* This is purely a question of Comparative Anatomy. It is founded on the instinctive perception that even between two frames so widely separated as those of an Ostrich and a Man, there is a common Plan of structure, with reference to which plan, parts wholly dissimilar in appearance and in use can nevertheless be identified as "representative" of each other:—that is, as holding the same relative place in one Ideal Order of arrangement.

The recognition of this idea in minds so rude is not the less remarkable from the fact that both sides in this African debate were wrong in their practical application of the idea to the particular case before them. Unity of design amidst variety of form is so conspicuous and universal in the works of Nature that the perception of it could not possibly escape recognition even by the rudest human mind, formed as that Mind is to see Order, and to work for it, and to admire it. But though instinct is enough to give us the general idea, and to trace it in a thou-

* "The Zambesi and its Tributaries," p. 424.

sand instances where it can hardly be overlooked, yet it needs close and laborious study, and high powers of analysis and of thought, to trace correctly the true Order and Plan through the fine and subtle passages of Nature. It would have astonished those poor natives of Africa to be told, as is the truth, that if they wished to find in the Ostrich the parts corresponding to their own middle finger, or ring-finger, or any other finger, they must look, not to the toes of the Ostrich, but to her little aborted wings, which, though useless for the purposes of flight, are still retained as representing the wings of other Birds, and the forearms of all the Mammals.

For here we come upon the interchange and crossing as it were of two distinct ideas, which seem to stand the one as the warp and the other as the woof in the fabrics of Organic Life. There is the idea of Homology in Structure and the idea of Analogy in Use. The one represents the Unity of Design, the other represents Variety of Function. It might have been supposed that these could not easily be reconciled—that where great differences in use and application are essential, rigid adherence to one pattern of structure would be an impediment in the way. But it is not so. The same bones in different animals are made subservient to the widest possible diversity of function. The same limbs are converted into paddles, and wings, and legs, and arms. And so it is with every other part of the skeleton and every other organ of the body. Indeed it is difficult to say whether the law of unity in design, or the law of variety in adaptation, is pushed to the greatest length. There are some cases in which the adaptation of form to special function is carried so far that all appearance of common structure is entirely lost. It is very difficult, for example, to persuade persons ignorant of the principles of anatomy that the Whale and the Porpoise are not Fish, that they breathe with lungs as Man breathes, that they would be drowned if kept long under water, and that, as they suckle their young, they belong to the same great Class, Mammalia. Living in the same element as Fish, and feeding very much as fishes feed, a similar outward form has been given to them, because that form is the best adapted for progression through the water. But that form has been, so to speak, *put on* round the Mammalian skeleton, and

covers all the organs proper to the Mammalian Class. Whales and Porpoises, notwithstanding their form, and their habitat, and their food, are as separate from Fishes as the Elephant, or the Hippopotamus, or the Giraffe.

And when we remember that the immense variety of Organic Forms in the existing world does not exhaust the adaptability of their Plan, but that the still vaster varieties of all the extinct creations have circled round the same central Types, it becomes evident that these Types have had from the first a Purpose which has been well and wonderfully fulfilled. As a matter of fact, we see that the original conception of the framework of Organic Life has included in itself provisions for applying the principle of adaptation in infinite degrees. Its last development is in Man. In his frame there is no abortive member. Every part is put to its highest use :—highest, that is, in reference to the supremacy of mind.* There are stronger arms, there are swifter limbs, there are more powerful teeth, there are finer ears, there are sharper eyes. There are creatures which go where he cannot go, and can live where he would die. But all his members are co-ordinated with one power—the power of Thought. Through this he has the dominion over all other created things—whilst yet as regards the type and pattern of his frame he has not a single bone or joint or organ which he does not share with some one or other of the Beasts that perish. It is not in any of the parts of his structure, but in their combination and adjustment, that he stands alone.

All these facts must convince us that we must enlarge our ideas as to what is meant by Use in the Economy of Nature. In the first place, it must be so interpreted as to include ornament; and in the second place, it must include also not merely Actual Use, but Potential Use, or the capacity of being turned to use in new creations. Of course this is one of the ideas which Philosophers of the Positive School denounce as "Metaphysical." But here again their opposition is itself based upon metaphysics, only upon metaphysics which are bad. "Potential existence," says Mr. Lewes,† "is ideal, not real." "A

* "Quid reliquâ descriptione omnium corporis partium, in quâ nihil inane, nihil sine causâ, nihil supervacaneum est?"—Cicero, "De Nat. Deor.," lib. i. cap. 33.

† "History of Philosophy," Prologue, p. lxxxviii.

fact is not a fact until it is accomplished. Nothing exists before it exists. This truism is disregarded by those who talk of potential existence." So it is, and it ought to be disregarded, because it has no bearing on the question. May not the formation of a plan or conspiracy to murder be "a fact" although the murder is not "accomplished?" Is not the capacity in the different pieces of a puzzle of being fitted together, a fact—even when the pieces are all huddled confusedly in a box? Is there no potential use in the udder of a cow-calf before it can have had any calves of its own? Is the idea of Potential use in all these cases an idea which has no "reality?" Are they mere "artifices of thought," or "preliminary falsifications of fact?" If the metaphysics of Positivism are available to establish this conclusion, they must be equally available to condemn knowledge in all its forms as "Ideal" and not "real." Bad metaphysics of this kind are indeed, what Dr. Newman dreads the human mind may be, a "universal solvent," casting doubt on the most certain of its own conclusions, and landing itself in universal scepticism.

We have not far to go to find the same kind of reasoning, and the same methods of analysis, employed to establish the converse proposition, that so far from Potentiality having no existence, it is the only form under which the existence of anything beyond ourselves can be known to us. No less eminent a thinker than Mr. J. S. Mill reduces Matter itself, and the very idea of the existence of an external world, to a "Permanent Possibility of Sensation." * Nay, he is not sure—he only sees some "intrinsic difficulties" in the way—whether our knowledge of Self-existence may not be brought under the same "Potential" category—as a mere "Possibility of Sensation." † In regard to Matter, Mr. Mill distinctly says that so far from a mere Possibility having no real existence, it is the only reality—the one thing which is constant and abiding behind the flux and uncertainty of actual sensations. My own opinion is that the metaphysical process by which these opposite paradoxes are arrived at is nearly as worthless in the one case as in the other. Of the two I prefer the paradox of Mr. Mill to the paradox of Mr. Lewes—so far at least as the reality of Potential Existences

* "Mill on Hamilton," chap. xi. † Ibid. chap. xii.

is concerned. But I prefer it only in the very case to which Mr. Mill shrinks from applying it. I *can* think of my own mind or existence as a "Possibility of Sensation" (whether "permanent" or not). It is a method of conception indeed which casts no light on anything, and it is highly artificial; but at least it is not false. It involves no confounding of two different elements of thought. But I cannot transfer the word or the idea of sensation from myself to the external things which cause sensation in me. This transfer involves a fundamental confusion of thought and of language as the instrument of thought. (See note D.) But such paradoxes are the natural result of one great error—the endeavor to get rid of, or to explain away, or to dissolve by analysis, such simple and elementary conceptions of the Mind as the idea of External Force and of Causation, or the idea of Purpose and Intention. Matter may very well be conceived as "That which produces, or has a Possibility of producing, Sensation in Sentient beings." But this is a definition which involves the idea of Causation. And if this be rejected as an elementary conception, (or as a distinct conception, whether elementary or not,) then the paradox of Mr. Mill is the natural result. In like manner, if the idea of Purpose and Intention be repudiated, as representing no "reality" in Nature, then the opposite paradox of Mr. Lewes is reached along the same slippery and deceptive ways. We know at least, as a matter of experience, that we are capable of forming plans which exist as such before they are carried into effect. We know too that one plan may be large enough to include another, and that even within the fractional limits of our foresight we can provide for contingent as well as for actual use. We can therefore easily conceive the existence of the same kind of prevision in the Mind which works in Nature, and we can easily understand how the apparent difference between actual and contingent use should be greater in proportion as the Plan is larger, and is designed to operate during vaster periods of Time.

In this point of view rudimentary or aborted organs need no longer puzzle us, for in respect to Purpose they may be read either in the light of History, or in the light of Prophecy. They may be regarded as indicating always either what had

already been, or what was yet to be. Why new creations should never have been made wholly new;—why they should have been always moulded on some pre-existing Forms;—why one fundamental ground-plan should have been adhered to for all Vertebrate Animals, we cannot understand. But as a matter of fact it is so. For it appears that Creative Purpose has been effected through the instrumentality of Forces so combined as to arrange the particles of organic matter in definite forms: which forms include many separate parts having a constant relation to each other and to the whole, but capable of arrestment or development according as special organs are required for the discharge of special functions. Each new creation seems to have been a new application of these old materials. Each new House of Life has been built on these old foundations. Among the many wonders of Nature there is nothing more wonderful than this—the adaptability of the one Vertebrate Type to the infinite variety of Life to which it serves as an organ and a home. Its *basement* has been so laid that every possible change or addition of superstructure could be built upon it. Creatures destined to live on the earth or in the earth, on the sea or in the sea, under every variety of condition of existence, have all been made after that one pattern; and each of them with as close an adaptation to special function as if the pattern had been designed for itself alone. It is true that there are particular parts of it which are of no use to particular animals. But there is no part of it which is not of indispensable use to some member of the group; and there is one Supreme Form in which all its elements receive their highest interpretation and fulfilment. It is indeed wonderful to think that the feeble and sprawling paddles on a Newt, the ungainly flippers of a Seal, and the long leathery wings of a Bat, have all the same elements, bone for bone, with that human hand which is the supple instrument of Man's contrivance, and is alive, even to the finger-tips, with the power of expressing his Intellect and his Will. Here again the Laws of Nature are seen to be nothing but combinations of Force with a view to Purpose: combinations which indicate complete knowledge, not only of what is, but of what is to be, and which foresees the End from the Beginning.

CHAPTER V.

CREATION BY LAW.

We see, then, how the existence of Organs separated from Function, and of structures without immediate use, find their natural place among all the other phenomena of the world. They do not show that "Law" is ever superior to Will, or can ever assert, even for a moment, an independence of its own. On the contrary, they show, as nothing else can show, the patient movements, and the incalculable years, through which material laws have been made to follow the steps of Purpose.

But, then, let us remember this: these discoveries in Physiology, though they are helpless to prove that Law has ever been present as a Master, are eminently suggestive of the idea that Law has never been absent as a Servant,—that as, in governing the world, so in forming it, Material Forces have been always used as the instruments of Will.

It is no mere theory, but a fact as certain as any other fact of Science, that Creation has had a History. It has not been a single act, done and finished once for all, but a long series of acts—a work continuously pursued through an inconceivable lapse of time. It is another fact, equally certain, respecting this work, that as it has been pursued in Time, so also it has been pursued by Method. There is an "observed Order of facts" in the history of Creation, both in the organic and in the inorganic world. I speak here, however, of the organic world alone, and chiefly of those higher Forms which are the seat of Animal Life. In these, there is an observed Order in the most rigid scientific sense—that is, phenomena in uniform connection, and mutual relations which can be made, and are made, the basis of systematic classification. These classifications are imperfect, not because they are founded on ideal connections where none exist, but only because they fail in representing adequately the subtle and pervading Order which binds together all living things.

But the Order which prevails in the existing world is not the only Order which has been recognized by science. A like Order has prevailed through all the past history of Creation. Nay, more; it has, I think, been clearly ascertained, not only that relations similar to those which now exist have existed always among all the animals of each contemporary Creation, but that Order of a like kind has connected with each other all the different Creations which were successively introduced. In almost all the leading Types of Life which have existed in the different geological ages, there is an orderly gradation connecting the Forms which were becoming extinct with the Forms which were for the first time appearing in the world. It is still disputed by some geologists, whether we have certain evidence that this gradation has been the gradation of a rising scale—of progressive Creations from lower to higher Types. But this dispute is maintained only on the ground that we cannot safely trust to negative evidence. It is an unquestionable fact, that so far as this kind of evidence can go, it does testify to the successive introduction of higher and higher Forms of Life. Very recently a discovery has been made, to which Mr. Darwin only a few years ago referred as "a discovery of which the chance is very small"—viz. of fossil Organisms in beds far beneath the lowest Silurian strata. This discovery has been made in Canada—in beds far down, near the bottom even, of the rocks hitherto termed "Azoic." But what are the Forms of Life which have been found here? They belong to the very lowest of living types—to the "Rhizopods." So far as this discovery goes, therefore, it is in strict accordance with all the facts previously known—that, as we go back in time, we lose, one after another, the higher and more complex organisms: first, the Mammalia; then the Vertebrata; and now, lastly, even the Mollusca. It is in accordance, too, with another fact which has been observed before, viz. that particular Forms of Life have attained, at particular epochs, a maximum development, both in respect to size and distribution—the favorites, as it were, of Creation for a time. These earliest Rhizopods seem to have been of enormous size, and developed on an enormous scale; since there is good reason to believe that beds of immense thickness are composed of their remains. All that is

new in this discovery is the vast extension which it gives in Time to the same rules which had been already traced through ages which we cannot number.

Then, there is another observed Order. For each Class of animal some definite Type or pattern has been adhered to, and the modifications of that Type have been gradual and successive. In many cases the science of fossil remains enable us to trace the intermediate Forms through which existing animals can be connected with animals long since extinct. It must be remembered that the fact of this connection is quite a separate thing from any theory as to its physical cause. Professor Owen pointed out some years before the publication of Mr. Darwin's theory, the existence of fossil animals which showed an increasing approximation to the forms of the Horse and of the Ox; and he showed that this approximation was related in Time, as it seemed to be in Purpose, with the coming need of them for the service and use of Man. These are the facts on which the idea of "Creation by Law" is founded. Let us look a little nearer what this idea is, and what it involves. It is an idea much vaunted by some men, much feared by others. Perhaps it may be found, on closer investigation, that they are fearing or worshipping, as the case may be, an idol of the imagination.

It being certain that Creation exhibits an Order of facts which can be so clearly defined and traced, it follows, that at least in this first sense of the word, Creation has been by Law. We are, therefore, led on to the farther question, whether Law in any other sense can be traced or detected in the work of Creation? Is the observed Order which prevails in the organic world an Order of which we can even guess the physical cause? Is it an Order which contains within itself any indications of the Force or combination of Forces which have been concerned in producing it?

In considering this question, there is one thing to be observed at the outset. It is certain that nothing is known, or has been even guessed at, in respect to the history and Origin of Life, which corresponds with Law in its strictest and most definite sense. We have no knowledge of any one or more Forces—such as the Force of Gravitation, or of magnetic at-

traction and repulsion—to which any one of the phenomena of Life can be traced. Far less have we any knowledge of any laws of the like kind which can be connected with the successive creation or development of new Organisms. Professor Huxley, in a recent work,* has indeed spoken of "that combination of natural forces which we term Life." But this language is purely rhetorical. I do not mean to say that Life may not be defined to be a kind of Force, or a combination of Forces. All I mean is, that we know nothing of any of these Forces in the same sense in which we do know something of the Force of Gravity, or of Magnetism, or of Electricity, or of Chemical Affinity. These are all more or less known, not, indeed, in respect to their ultimate nature, but in respect to certain methods and measures of their operation. No such knowledge exists in respect to any of the Forces which have been concerned in the development of Life. No man has ever pretended to get such a view of any of these as to enable him to apply to them the instruments of his analysis, or to trace in their working any definite relations to Space, or Time, or Number.

Since, then, laws, in this most definite sense of the word, have not been discovered in the existing phenomena, or in the past history of Organic Life, let us look a little closer at the ideas which these phenomena have suggested to the mind of those who have speculated on the Origin and Development of Species.

There is one idea which has been common to all theories of Development, and that is, the idea that ordinary generation has somehow been producing, from time to time, extraordinary effects, and that a new Species is, in fact, simply an unusual birth. It is worthy of observation, that the earlier forms in which the theory of Development appeared, did suggest something more nearly approaching to a Law of Creation than is contained in the later form which that theory has assumed in the hands of Mr. Darwin. The essential idea of the theory of Development, in its earlier forms, was, that modifications of structure arose somehow by way of natural consequence from the outward circumstances or physical conditions which re-

* "Elements of Comparative Anatomy," p. 2.

quired them, and from the living effort of Organism sensible in some degree of that requirement. Now, inadequate and even grotesque though this idea may be as explaining the Origin of new Species it cannot be denied, that it makes its appeal to a process which, at least to a limited extent, does operate in producing modifications of organic structure. For example, the same species of Mollusc has often a shell comparatively weak and thin, or a shell comparatively robust and strong, according as it lies in tranquil or in stormy water. The shell which is much exposed needs to be stronger than the shell which is less exposed. But it is obvious that the mere fact of the need cannot supply the thing needed, unless by the adjustment of some machinery for the purpose. How the vital forces of the Mollusc can thus be made to work to order, under a change of external conditions, we do not know. But we do know, as a matter of fact, that the shell is thickened and strengthened, according as it needs resisting power. This result does not appear to arise from any difference in the amount of lime held in solution in the water, but from some power in the secreting organs of the animal to appropriate more or less of it according to its own need. The effects of this power are seen where there is no difference of condition except difference of exposure. It is said that they are observable, for example, in the shells which lie on the different sides of Plymouth Breakwater,—the sheltered side and the exposed side. The same power of adaptation is seen in many other forms. Trees which are most exposed to the blast are the most strongly anchored in the soil. Limbs which are the most used are the most developed. Organs which are in constant use, are strengthened, whilst organs in habitual disuse have a tendency to become weaker.

All these results arise by way of natural consequence. How shall we describe them? Shall we say that they are the result of Law? We may safely do so, remembering only that by Law, in this sense, we mean nothing but the co-operation of different natural Forces, which, under certain conditions, work together for the fulfilment of an obvious intention. Of the nature of those Forces we know nothing; nor is it easy to conceive how they have been so co-ordinated as to produce

effects fitting with such exactness into the conditions requisite for the preservation of Organic Life. If there were any evidence that by the same means new Forms of Life could be developed from the old, I cannot see why there should be any reluctance to admit the fact. It would be different from anything that we see; but I do not know that it would be at all less wonderful, or that it would bring us much nearer than we now stand to the great mystery of Creation. The adaptation and arrangement of natural forces, which can compass these modifications of animal structure, in exact proportion to the need of them, is an adaptation and arrangement which is in the nature of Creation. It can only be due to the working of a power which is in the nature of Creative power.

We are so accustomed to these and other similar phenomena, and so apt to hide our own ignorance of their cause, by describing them as the result of "Law," that we forget what a multitude of natural Forces must be concerned in their production, and what complicated adjustmemts of these amongst each other for the accomplishment of Purpose. It is purely, therefore, in my view a question of evidence, whether this particular law of adaptation has or has not been the means of introducing new Forms of Life. There is no evidence that it has. So far as we know, this power of self-adaptation, wonderful as it is, has a comparatively limited application; when that limit is outrun by changes in outward conditions, which are too great or too rapid, whole Species die and disappear. Nevertheless, the introduction of new Species to take the place of those which have passed away, is a work which has been not only so often but so continuously repeated, that it does suggest the idea of having been brought about through the instrumentality of some natural process. But we may say with confidence, that it must have been a process different from any that we yet know—a process not the same as that (obscure as that is) which produces the lesser modifications of Organic Forms.

It has not, I think, been sufficiently observed, that the theory of Mr. Darwin does not address itself to the same question, and does not even profess to trace the Origin of new Forms to any definite law. His theory gives an explanation, not of the processes by which new Forms first appear, but only of the proc-

esses by which, when they have appeared, they acquire a preference over others, and thus become established in the world. A new Species is, indeed, according to his theory, as well as with the older theories of Development, simply an unusual birth. The bond of connection between allied specific and generic Forms, is in his view simply the bond of Inheritance. But Mr. Darwin does not pretend to have discovered any law or rule according to which new Forms have been born from old Forms. He does not hold that outward conditions, however changed, are sufficient to account for them. Still less does he connect them with the effort or aspirations of any Organism after new faculties and powers. He frankly confesses that "our ignorance of the laws of variation is profound;" and says, that in speaking of them as due to chance, he means only "to acknowledge plainly our ignorance of the cause of each particular variation."* Again he says—"I believe in no law of necessary development."†

This distinction between Mr. Darwin's theory and other theories of Development, has not, I think, been sufficiently observed. His theory seems to be far better than a mere theory —to be an established scientific truth—in so far as it accounts, in part at least, for the success and establishment and spread of new Forms *when they have arisen*. But it does not even suggest the law under which, or by which, or according to which, such new Forms are introduced. Natural Selection can do nothing except with the materials presented to its hands. It cannot select except among the things open to selection. Natural Selection can originate nothing; it can only pick out and choose among the things which are originated by some other law. Strictly speaking, therefore, Mr. Darwin's theory is not a theory on the Origin of Species at all, but only a theory on the causes which lead to the relative success or failure of such new Forms as may be born into the world. It is the more important to remember this distinction, because it seems to me that Mr. Darwin himself frequently forgets it. Not only does he speak of Natural Selection "producing" this and that modification of structure, but he undertakes to affirm

* "Origin of Species," p. 131 (first edition).
† Ibid. p. 351.

of one class of changes that they can be produced, and of another class of changes that they cannot be produced by this process.*

Now, what are the changes for the preservation of which Natural Selection does, in some sense, account? They are such changes, and these only, as are of some direct use to the Organism in the "struggle for existence." Any change which has not this direct value, is not provided for in the theory. All structures, therefore, are unaccounted for—not only as respects their origin, but even as respects their preservation—in which the variations have no other value than mere beauty or variety. Accordingly, Mr. Darwin is tempted, as I have already had occasion to observe, to deny that any such structures exist in Nature. Any theory of which this denial is really a necessary part, is self-condemned. Yet a theory may be good as accounting for the preservation of some structures, although it fails to account for the preservation of others. And so the fact that Natural Selection cannot have operated on structures of mere beauty and variety is no proof that the theory of Natural Selection is false, but only that it is incomplete. It does not account for the origin of any structure; and it accounts for the preservation of only a certain number. Surely, then, Mr. Darwin assigns to his "law" of Natural Selection a range far wider than really belongs to it, when, on the strength of it, he denies that beauty for its own sake can be an end or object in Organic Forms. He says—"This doctrine, if true, would be absolutely fatal to my theory." Why should this be fatal to his theory, except on the supposition that Natural Selection gives a *complete* account both of the Origin of new Forms, (of which, in reality, it gives no account at all,) and of their preservation, of which it does give some account, but one which is only partial? I dwell on this, because it lies at the very root of the question, how far Mr. Darwin's theory can be said to suggest anything in the nature of a Creative Law of a kind to explain the Method which has been followed in the introduction of new Forms.

We may test this question by bringing to bear upon it some particular example of specific variation. I select for this pur-

* "Origin of Species," p. 200 (first edition).

pose one example, which will illustrate the subject better than any abstract discussion. It is the case of the Humming Birds.

This group of Birds seems to exhibit, in the most striking form, not a few of those mysteries of Creation which at once tempt us to speculate on the Origin of Species, and at the same time confound every endeavor to bring it into relation with any process which we know or can conceive. In the first place, they are sharply defined from all other forms in that Class of the animal kingdom to which they belong. It is most difficult to say what is their nearest affinity, and the nearest, when it is found, is very distant. Secondly, they are absolutely confined to one Continent of the Globe. In the third place, the various Species as amongst themselves are very closely united, ranging, indeed, over a great variety of forms, but for the most part connected with each other by very nice gradations. In the fourth place, there are, so to speak, some gaps in the scale, which suggest that some Species have either been lost, or have not yet been discovered. In the fifth place, each of these Species, however nearly allied to some other, appears to be absolutely fixed and constant, there being not the slightest indication of any mixture—of any hybrid forms. In the sixth place, there is the most wonderful adaptation of special organs for the performance of special functions, and for the relation of these organs to particular structures in the vegetable kingdom. In the seventh place, there is a development, for which, in extent and variety, there is no parallel in the world, of structures designed apparently for mere ornament, and entirely separate from any other known or conceivable use.

A few words on some of these characters will show their separate and joint bearing on the idea of Creation by Law.

In the first place, then, the absolute distinctiveness from all others of this Family of Birds, coupled with its immense extent gives the idea of some common bond, some physical cause, to which such an identity in physical characters must be due. This identity prevails not only in such essential matters as the structure of the bill and tongue, in the form of the feet and of the wings, in the habits of flight, and in the nature of the food. but runs also into some very curious details, as, for example, in the number of feathers in the tail and in the wings, which

are constant numbers—adhered to even when some of the feathers, not being used even for ornament, are reduced almost to rudiments. But under degrees of development which are very variable, the number is invariable. This identity of structure is the more remarkable from the immense extent of the group which it characterizes. There are now known to science no less than about 430 different species of Humming Bird; and it cannot be doubted that many more remain to be discovered among the immense forests and mountain ranges of Central America.

Now, what is the bond that unites so closely, in a common structure, all the forms of this great Family of birds? We think it a sufficient explanation sometimes of the likeness of things, that they are made for a common purpose. And so it is an explanation in one sense, but not in another. It gives the reason why likeness should be aimed at, but not the cause or the means through which it has been brought about. Sameness in the purpose for which things are intended, is a reason why those things should be made alike; but it is no explanation of the process to which the common aspect is due. It is an explanation of the "why;" but it is no explanation of the "how." Purpose is attained in Nature through the instrumentality of means; and community of aspect in created things suggests the idea of some common process in the creative work. Thus, the likeness which is due to common parentage serves the most important purposes; but it is not the less the result of a physical cause out of which it arises by way of natural consequence. The likeness of the Humming Birds to each other suggests this kind of cause. It is true that the organs which it principally affects are specially adapted for a special habit of life. They are fitted to enable the Bird to feed on the nectar, and the insects which frequent the nectar of flowers, or the leaves or bark of trees. But there are flowers and insects in abundance in other quarters of the globe where there are no Humming Birds.

And here we come on the curious facts of geographical distribution,—a class of facts which, as much as any other, suggest some specific methods as having been followed in the work of Creation. Humming Birds are absolutely confined to the great

Continent of America with its adjacent islands. Within those limits there is every range of climate, and there are particular species of Humming Bird adapted to every region where a flowering vegetation can subsist. It is therefore neither climate nor food which confines the Humming Birds to the New World. What is it, then? The idea of "centres of Creation" is at once suggested to the mind. It seems as if the Humming Birds were introduced at one spot, and as if they had spread over the whole Continent which was accessible to them from that spot. They are absent elsewhere, simply because from that spot the other Continents of the world were inaccessible to them. But if these ideas are suggested to the mind by the general aspect of this family as a whole, they are strengthened by some of the facts which we discover when we examine and compare with each other the genera and species of which it is composed. There is a beautiful gradation between the different genera and the different species,—so much so, that it has been found impossible to divide the Humming Birds into more than two subfamilies, from the absence of sufficiently well-marked divisions. And yet on the other hand, they cannot be arranged in anything like a continuous series, because some links appear to be missing in the chain.

But these general facts terminate in nothing more definite than a vague surmise. When we enter farther into details, we feel at once how little they agree with any physical law which is known or even conceivable by us. If the likeness which prevails in the whole group reminds us of the likeness which is due to community of blood, it is equally true that the differences between the species are totally distinct, both in kind and degree, from the variation which we ever see arising among the offspring of the same parents. Let us look at what these differences are. The generic and specific distinctions between the Humming Birds are mainly of two kinds,—*1st*, Differences in the form of essential organs, such as the bill and the wings; *2d*, Differences in those parts of the plumage which are purely ornamental. Now, of these two kinds of variation, the only one on which the law of Natural Selection has any bearing at all is the first. And on that kind of variation, the only bearing which Natural Selection has is this—that if any Humming Bird were

born with a new form of bill, or a new form of wing, which enabled it to feed better and to range farther, then that improved bill and wing would naturally tend to be perpetuated by ordinary generation. This is unquestionably true; but it really does not touch the facts of the case. The bills and wings of the different genera do not differ from each other in respect of any comparative advantage of this kind, but simply in respect to variety corresponding with the variety of certain vegetable Forms. One form of bill is as good as another, but some forms are adapted to some special class of flower. Some bills, for example, are formed of enormous length, specially adapted to obtain access to the nectar chambers of long tubular flowers, such as the *Brugmansia*. Some, on the other hand, as if to show that the same end may be attained by different means, obtain access to the same flowers by a shorter process, and pierce the bases of the corolla instead of seeking access by the mouth. Some have bills bent downwards like a sickle, adapted to searching the bark of Palm-trees for the insects hid under the scaly covering; others have bills curved in the opposite direction, fitted, apparently, to the curious construction of some of the great family of Orchids so immensely developed in the forests of Central America. Some have bills equally well adapted for searching a vast variety of flowers and blossoms, and these, accordingly, migrate with the flowering season, and, issuing from the great stronghold of the family in tropical America, spread like our own summer Birds of passage, northwards to Canada, and southwards to Cape Horn, in the corresponding seasons of the year. In contrast with these species of extended range, there are many species whose habitat is confined, perhaps to a single mountain, and there are a few which never have been seen beyond the edges of some extinct volcano, whose crater is now filled with a special flora. Many of the great mountains of the Andes have each of them species peculiar to themselves. On Chimborazo and Cotopaxi, and other summits, special forms of Humming Birds are found in special zones of vegetation even close up to the limits of perpetual snow. Again, many of the Islands have species peculiar to themselves. The little island of Juan Fernandez, 300 miles from the mainland, has three species peculiar to itself, of which

two are so distinct from all others known, that they cannot for a moment be confounded with any of them.*

It is impossible not to see, in such complicated facts as these, that the creation of new Species has followed some plan in which mere variety has been in itself an object and an aim. The divergence of form is not a divergence which can have arisen by way of natural consequence, merely from comparative advantage and disadvantage in the struggle for existence. Bills highly specialized in form are certainly not those which would give the greatest advantage to birds which have equal access to the abundant Flora of an immense Continent. Some form of bill adapted to the probing or piercing of all flowers with almost equal ease, would seem to be the form most favorable to the multiplication and spread of Humming Birds. Continued approximation to some common type would seem to be quite as natural a change, and a much more advantageous kind of change as regards advantage in the struggle for existence, than endless divergence and special adaptation to limited spheres of enjoyment. At all events, we may safely say that mere advantage, in Mr. Darwin's sense, is not the rule which has chiefly guided Creative Power in the Origin of these new Species. It seems rather to have been a rule having for its object the mere multiplying of Life, and the fitting of new Forms for new spheres of enjoyment, according as these might arise out of corresponding changes in other departments of the organic world.

If, now, we turn to the other kind of specific distinction between Humming Birds, viz., that which consists in differences in the mere coloring and disposition of the plumage, we shall find the same phenomena still more remarkable. In the first place, it is to be observed of the whole group that there is no connection which can be traced or conceived between the splendor of the Humming Birds and any function essential to their life. If there were any such connection, that splendor could not be confined, as it almost exclusively is, to one sex. The female Birds are of course not placed at any disadvantage in the struggle for existence by their more sombre coloring. Mere utility in this sense, therefore, can have had no share in

* Gould's "Trochilidæ."

determining one of the most remarkable of all the characteristics of this family of Birds. It is obviously beside the question to account, as Mr. Wallace and Mr. Darwin do, for the beauty of the Humming Birds upon the ground that the males are thus rendered more attractive to the females. This attractiveness can only operate as between different individuals of the same species, since no one ever heard of the females of a dull-colored species wandering in their affection from their rightful lords to the more brilliant males of some other species. Every animal, however little beautiful it may be in our eyes, has sufficient attractiveness as between the sexes to secure the great object of the continuation of its race. Utility, indeed, in a different sense, can be quoted with probability, as accounting for the comparative plain coloring of females in this and in almost all other genera of Birds. But then it is Utility conceived as operating by way of motive in a Creative Mind, and not operating as a physical cause in the production of a mechanical result. And here we find Mr. Wallace instinctively testifying to this great distinction, and employing language which indicates the passage from one order of ideas to another. He says, "The REASON WHY female birds are not adorned with equally brilliant plumes is sufficiently clear; they would be injurious by rendering their possessors too conspicuous during incubation." * This is, no doubt, the true explanation of the purpose which the plain coloring of female Birds is intended to serve; but it is no explanation at all of the physical causes by which this special protection is secured.

Those who, by special study, have laid their minds alongside the Mind of Nature in any of her Provinces, have generally imparted to them a true sense, so far as it goes, in the interpretation of her mysteries. Let us then hear what Mr. Gould says on the beauty of the Humming Birds:—"The members of most of the genera have certain parts of their plumage fantastically decorated; and in many instances most resplendent in color. My own opinion is, that this gorgeous coloring of the Humming Birds has been given for the mere purpose of ornament, and for no other purpose of special adaptation in their mode of life; in other words, that ornament and beauty, merely as

* *Quarterly Journal of Science*, Oct., 1867, p. 481.

such, was the end proposed." * Different parts of the plumage have been selected in different genera as the principal subject of ornament. In some, it is the feathers of the crown worked into different forms of crest, in some, it is the feathers of the throat, forming gorgets and beards of many shapes and hues, in some, it is a special development of neck plumes, elongated into frills and tippets of extraordinary form and beauty. In a great number of genera the feathers of the tail are the special subjects of decoration, and this on every variety of plan and principle of ornament. In some, the two central feathers are most elongated, the others decreasing in length on either side, so as to give the whole the wedge form. In others, the converse plan is pursued, the two lateral feathers being most developed, so that the whole is forked after the manner of the common Swallow. In others, again, they are radiated or pointed and sharpened like thorns. In some genera there is an extraordinary development of one or two feathers into plumes of enormous length, with flat or spatulose terminations. Mere ornament and variety of form, and these for their own sake, is the only principle or rule with reference to which Creative Power seems to have worked in these wonderful and beautiful Birds. And if we cannot account for the differences in the general style and plan of ornament followed in the whole group, by referring them to any sort of use in the struggle for existence, still less is it possible to account, on this principle, for the kind of difference which separates from each other the different species in each of the genera. These differences are often little more than a mere difference of color. The radiance of the ruby or topaz in one species, is replaced perhaps by the radiance of the emerald or the sapphire in another. In all other respects the different species are sometimes almost exact counterparts of each other. As an example, let me refer to the two species figured by Mr. Gould as the Blue-tailed and the Green-tailed Sylphs; and also to two species of the "Comets," in which two different kinds of luminous reds or crimsons are nearly all that serve to distinguish the species.

A similar principle of variation applies in other genera, where the amount of difference is greater. For example, one of the

* Gould's "Trochilidæ," Introduction.

most singular and beautiful of all the tribe is comprised within the genus *Lophornis*, or the "Coquettes." The principle of ornament in this genus is, that the different species are all provided both with brilliant crests, and with frills or tippets on the neck. The feathers of these parts are generally of one color, ending in spots or spangles of another; the spangles being generally of metallic lustre. There seems to be a rule of inverse proportion between the two kinds of ornament. The species which have the neck plumes longest have the shortest crests and *vice versâ*. In the shape and structure of all essential organs there is hardly any difference between the species.

One very curious example of variety for the sake of ornament may be mentioned in connection with this wonderful family of Birds. It is a law—in the sense of an observed order of facts—regulating the ornament of Humming Birds, that where white is introduced into the coloring of the tail feathers, it is not applied to the central feathers, but is confined to the marginal feathers on either side. There is, however, one species (*Urosticte Bengamini*), recently discovered, which affords the only example yet known of a departure from this rule. It is a species in which white is one of the principal ornaments of the Bird, and is used in places where it can be placed in conspicuous contrast with the darkest tints. Tufts and lines of purest white shine among the greens and violets of the neck and head, whilst, in exquisite harmony with this, the four central feathers of the tail are alone dipped, as it were, in a solid glaze of the same white, and the marginal feathers on either side are kept wholly dark. Then, as if to mark with emphasis the meaning of this departure from the ordinary rule, it is a departure confined to the ornamented sex; and the Female Form of the same species follows the ordinary law—white being introduced in the marginal feathers, and in these alone.

Now, what explanation does the law of Natural Selection give—I will not say of the origin, but even of the continuance and preservation—of such specific varieties as these? None whatever. A crest of topaz is no better in the struggle for existence than a crest of sapphire. A frill ending in spangles of the emerald is no better in the battle of life than a frill ending in the spangles of the ruby. A tail is not affected for the purposes

of flight, whether its marginal or its central feathers are decorated with white. It is impossible to bring such varieties into relation with any physical law known to us. It has relation, however, to a Purpose, which stands in close analogy with our own knowledge of Purpose in the works of Man. Mere beauty and mere variety, for their own sake, are objects which we ourselves seek when we can make the Forces of Nature subordinate to the attainment of them. There seems to be no conceivable reason why we should doubt or question, that these are ends and aims also in the Forms given to living Organisms, when the facts correspond with this view, and with no other. In this sense, we can trace a creative law,—that is, we can see that these Forms of Life do fulfil a purpose and intention, which we can appreciate and understand.

But then it may be asked, has this purpose and intention been attained without the use of means? Have no physical laws been used, whereby these new forms of beauty have been evolved, the one from the other, in a series so wonderful for its variety in unity, and its unity in variety? I am not now seeking to answer this question in the negative. All I say is, that the physical laws which are made subservient to this purpose are entirely unknown to us. That particular combination of a great many natural laws, which Mr. Darwin groups under the name of Natural Selection, does not in the least answer the conditions which we seek in a law to account for either the origin or the spread of such creatures as the various kinds of Humming Birds. On the other hand, if I am asked whether I believe that every separate Species has been a separate creation—not born, but separately made—I must answer, that I do not believe it. I think the facts do suggest to the mind the idea of the working of some creative Law, almost as certainly as they convince us that we know nothing of its nature, or of the conditions under which it does its glorious work. Our experience of the existing Order of Nature is, that the young of each species repeat the form and the colors of their parent, and that even where variations occur, they are inconstant, and tend to disappear. We have no knowledge, for example, that from the eggs of the Blue-tailed Sylph a pair of Green-tailed Sylphs can ever be produced. We have no reason to believe that a species of *Lophornis*

with a tippet of emerald spangles, can ever hatch out a pair of young adorned with spangles of some other gem. And yet we cannot assert that such phenomena are impossible, nor can it be denied that, as a matter of speculation, this process is natural and easy of conception, as compared with the idea of each Species being separately called into existence, out of the inorganic elements of which its body is composed.

Such new births—if they do take place—would perfectly fulfil, I think, the only idea we can ever form of new creations. For example, it would appear that every variety which is to take its place as a new Species must be born male and female; because it is one of the facts of specific variation in the Humming Birds, that although the male and female plumage is generally entirely different, yet the female of each species is as distinct from the female of every other, as the male is from the male of every other. If, therefore, each new variety were not born in couples, and if the divergence of Form were not thus secured in the organization of both the sexes, it would fail to be established, or would exhibit for a time the phenomena of mixture, and terminate in reversion to the original type. Now here again we have the emphatic declaration of Mr. Gould, that among the thousands of specimens which have passed through his hands, from all the genera of this great family, he has never seen one case of mixture or hybridism between any two Species, however nearly allied. But this passage is so important, that I quote it entire. "It might be thought by some persons that four hundred species of birds so diminutive in size, and of one family, could scarcely be distinguished from each other; but any one who studies the subject, will soon perceive that such is not the case. Even the females, which assimilate more closely to each other than the males, can be separated with perfect certainty; nay, even a tail-feather will be sufficient for a person well versed in the subject to say to what genus and species the Bird from which it has been taken belongs. I mention this fact to show that what we designate a Species has really distinctive and constant characters; and in the whole of my experience, with many thousands of Humming Birds passing through my hands, I have never observed an instance of any variation which would lead me to suppose that it was the result

of a union of two species. I write this without bias, one way or the other, as to the question of the Origin of Species. I am desirous of representing Nature in her wonderful ways as she presents herself to my attention at the close of my work, after a period of twelve years of incessant labor, and not less than twenty years of interesting study." *

If, therefore, new Species are born from the old, it is not by accidental mixture; it is not by the mere nursing of changes advantageous in the battle of life; it must be from the birth of some one couple, male and female, whose organization is subjected to new conditions corresponding with each other, and having such force of self-continuance as to secure it against reversion. It matters not how small the difference may be from the parent Form; if that difference be constant, and if it be associated with some difference equally constant in the female Form, it becomes at once a new Species. There are some cases mentioned by Mr. Gould which may possibly be examples of the first founding of a new Species. In the beautiful genus *Cynanthus*, he tells us that there are some local varieties near Bogota, in which the ornament is partially changing from blue to green, and it is a curious fact that this variation appears to be taking effect under the direction of some definite rule or "law,"—inasmuch as it is only the eight central feathers of the tail which are tipped with the new color. Mr. Gould expressly says of one such variety from Ecuador, that it possesses characters so distinctive as to entitle it, in his opinion, to the rank of a separate Species. The very discussion of such a question shows the possibility of new births being the means of introducing new Species. But my object here is simply to point out that Mr. Darwin's theory offers no explanation of such births, either as respects their origin or their preservation, neither does it even approach to tracing these births to any physical law whatever. It fails also to recognize, even if it does not exclude, the relation which the birth of new Species has to the mental purpose of producing mere beauty and mere variety. Nevertheless it may be true that ordinary generation has been the instrument employed; but if so, it must be em-

* Gould's "Trochilidæ," Introduction.

ployed under extraordinary conditions, and directed to extraordinary results.

It will be seen, then, that the principle of Natural Selection has no bearing whatever on the Origin of Species, but only on the preservation and distribution of Species when they have arisen. I have already pointed out that Mr. Darwin does not always keep this distinction clearly in view, because he speaks of Natural Selection "producing" organs, or "adapting" them. It cannot be too often repeated that Natural Selection can produce nothing whatever, except the conservation or preservation of some variation otherwise originated. The true Origin of Species does not consist in the adjustments which help varieties to live and to prevail, but in those previous adjustments which cause those varieties to be born at all. Now what are these? Can they be traced or even guessed at? Mr. Darwin has a whole chapter on the Laws of Variation,* and it is here, if anywhere, that we look for any suggestion as to the physical causes which account for the Origin as distinguished from the mere preservation of Species. He candidly admits that his doctrine of Natural Selection takes cognizance of variations only after they have arisen, and that it regards those variations as purely accidental in their origin, or, in other words, as due to chance. This, of course, he adds, is a supposition wholly incorrect, and only serves "to indicate plainly our ignorance of the cause of each particular variation." Accordingly, the Laws of Variation which he proceeds to indicate are merely, for the most part, certain observed facts in respect to Variation, and do not at all come under the category of Laws, in that higher sense in which the word Law indicates a discovered method under which Natural Forces are made to work. There is, however, in this chapter, one Law which approaches to a Law in the higher sense. Mr. Darwin, whilst candidly confessing our profound ignorance of the cause or origin of varieties, yet groups together a great class of facts as connected by a tie which he calls the "Correlation of Growth." Now what is this law—this observed Order of facts? It is, that variation in one part of an organism is, as a rule, accompanied with corresponding variations in other parts, and especially in those parts which are "homologous,"

* "Origin of Species," chap. v.

that is to say, which occupy the same relative place in the general Plan.

This, however, is but a very imperfect definition of the vast Order of mysterious facts which are covered by the words, "Correlation of Growth." The fundamental idea which these words express is an Idea of wider and deeper significance in Nature, than Mr. Darwin seems to have perceived. There is a correlation between all natural organic growths; that is to say, that any variation of form in a single part has a constant relation to other variations of form in some other part or parts of the same organism. But "relation" is a vague word. There are many kinds of "relation"—there are indeed an infinite variety of kinds. What is the kind of relation that we detect in Correlated Growths? It is not until we ask ourselves this question that we discover what a deep question it is—how endless are the avenues of thought and of inquiry which it opens up.

First, one relation which we detect in all variations of organic growth, is simply the relation of symmetry. This kind and degree of Correlation of Growth prevails even in the world which we call Inorganic. The corresponding sides and angles of a crystal, for example, may be said to be correlated together. The nature of this relation is geometrical and numerical. It is a relation having reference to invariable rules of number. As regards its physical cause, all we can say is, that it is the result of forces whose property it is to aggregate the particles of matter in definite forms, which forms are symmetrical—that is to say, they are forms having an axis with equal developments on either side. Correlation of Growth, therefore, in this sense points to the work of Forces, one of whose essential properties is Polarity—that is, equal and similar action in opposite directions. Now, this kind of Correlation of Growth may be traced upwards from simple Minerals through all the infinite complications of the organic world. It is unquestionably the basis of many of the Correlations of Growth prevailing in Plants and Animals. It is seen in the symmetrical arrangement of all vegetable and of all animal Forms. A central axis is traceable in them all; and the Bilateral or Radiated arrangement of their

subordinate parts is one of the most fundamental and universal of all the Correlations of Growth.

This is one, but it is one only, of the Correlations of Growth which are constantly observed. It would lead us to expect that any change of form on one side of an animal would be accompanied by an exactly corresponding change on the other side: so that limbs on one side of the central axis, if changed at all, would change in exact and symmetrical accordance with the limbs on the opposite and corresponding side. This, accordingly, is one of the Correlations of Growth most constantly observed.

Now, it will be seen that Correlation of Growth, in this first and simplest sense, runs alongside, as it were, of Correlation in another and higher sense. The relation between two equal and opposite growths, which is a relation, in the first place, of simple symmetry as between themselves, is always accompanied by another relation, in the second place, of correspondence or fitness as between these growths and external conditions. An organism which is developed unsymmetrically, unequally, would be not only ugly in its form, but it would be maimed and imperfect in its functions. Here, then, we see one kind and one idea of Correlation rising above another. Two growths might be correlated as regards each other, and might yet be wanting in any corresponding correlation of fitness and of function towards outward things. But the first of these two kinds of correlation would be useless without the last. And this last is obviously the higher and more complex Correlation of the two. It is higher, not only in the sense of being more complex, but as involving an idea which lifts us at once from a lower to a higher region of thought. Growths correlated as between each other according to mere symmetry of arrangement suggest nothing, except the work of Forces with inherent Polarity of action. But growths correlated with things outside the organism in which those growths occur,—and which can exert no physical effect upon it,—suggest at once the operation of Forces working under Adjustment with a view to Purpose.

When we see a Mineral salt crystallizing under the power of a Voltaic Current, we see Correlation of Growth in its simplest form, and in visible connection with its immediate cause. The

particles of salt are marshalled in a constant Order—an Order, the principle of which is some central axis, with branches and branchlets grouped around it in equal and exquisite arrangement. Wonderful as this arrangement is, it suggests no other question to the mind than that which may be asked in respect to the ultimate nature and source of Polarity in Magnetic Force. But when we see two growths in an organism which not only are correlated to each other with reference to a centre, but are correlated also to external things with reference to Function, we see something which raises questions altogether different in kind. We have passed at once from the region of the What, and the How, into the region of the Why. The one kind of Correlation has reference to Physical Causes, the other kind of correlation has reference to those Mental Purposes which Physical Causes are made to serve. These two kinds of Correlation are perfectly distinct. They are as distinct as the correlation of equal pressures which a given volume of steam exerts upon the opposite sides of a boiler is distinct from the correlation between that pressure and its conversion into the driving-force of cranks and wheels, with all their adaptations for running on the rails, or for paddling in the sea. They are as distinct as the correlations of force developed in a Voltaic Battery are distinct from the adjustments which convert those forces into the means of communicating Thought.

Mr. Darwin has not pointed out this distinction clearly. Indeed, he does not seem to have had it in his view. He groups under one name,—the Correlation of Growth,—two classes of Phenomena, which are indeed always combined in fact, but which are entirely separate in idea. Correlation of Growth, in one sense, is that law of vital force which secures that any change in the shape of one limb in an animal shall be accompanied by a corresponding change in all the other limbs. Correlation of Growth in the other sense, is that adjustment of vital forces to the contingencies of external circumstance, which secures that all the changes which do take place shall be changes adapted to the discharge of new functions—to the fulfilment of new conditions of life—to command over new sources of enjoyment.

Keeping, then, clearly in our view the distinction between

these two different kinds of Correlation of Growth, let us look at the phenomena actually presented in the aspect and history of Organic Forms, as respects both these kinds of Correlation.

As regards the first kind of Correlation, I have referred to the law of Bilateral Symmetry as the simplest and most obvious illustration. It is a law which at once connects itself with the idea of Polarity of Force. But though this be one kind of Correlation, almost universal, and may very probably be the foundation of every other, there are many Correlations of Growth between which and mere Polarity there is no visible connection. The truth is that all the parts of an organism are bound together as one whole by a pervading system of correlations as intricate as they are obscure. When the organism is in health, and all its parts are working in harmony, the wonder of these correlations is not perceived. But they are brought out in a marked degree by the phenomena of disease, and also by the phenomena of monstrosity or malformation. The "sympathy" which the most distant and apparently unconnected parts of an organism show with each other, when one of them is affected by disease, is the index of correlations whose nature is utterly beyond the reach of our anatomy. It is the same with malformations. Mr. Darwin mentions one case of curious unintelligible correlation—viz., that a blue iris is associated in Cats with deafness; and, again, that the tortoise-shell color of the fur is associated with the female sex in the same animal. In like manner the bright colors, and the more conspicuous ornaments of plumage in Birds, are correlated with the male sex. So likewise are vocal organs with the wonderful gift of song. In many insects the differences of form which are correlated with the differences of sex, are far greater than the differences which separate species and even genera. There are insects of which the male is a fly, whilst the female is a worm. There are many other cases of correlation between different growths in respect to which the nature and source of the connection is equally unknown. For example, the complex stomachs of the Ruminant Order are uniformly associated with a particular form of hoof. Sometimes correlations the most constant and invariable are at the same time the most subtle and the most secret, because they are hid under other growths which are not

so correlated, and which produce total diversities of outward aspect. One very curious class of correlations is the correlation between the internal structure of the teeth in animals, and the structure of other very distant portions of their frame. There lately was, for example, in the Zoological Gardens, a little animal, the Hyrax, not unlike a Rabbit in general appearance, and very like it in habit. It is the "Cony" of Scripture. Now this little animal will be found on examination to have limbs which do not terminate in a foot like a Rabbit, but in a divided hoof of peculiar form. This hoof is in miniature like the hoof of a Rhinoceros. If next we examine the teeth of the Hyrax we shall find that the materials of these teeth are also combined in the same manner, and after the same pattern as the teeth of the Rhinoceros. So it is with other parts of the same two animals. Along with the teeth and the hoofs there are certain other shapes of bones which seem to be under the same bond of likeness. Now these are Correlations of Growth between different parts of the same animal, and between the corresponding parts in two different species.

The conception, then, which we are led to form by this kind of Correlation between organic growths, is more complex than we had at first supposed. Mere Polarity of Force, leading to equal and opposite arrangement of subordinate parts, is not enough to satisfy the facts. This, indeed, may continue to be the type to which our thoughts refer, and by which we are helped to some more adequate idea of the facts. But the general impression left on the mind is this—that some One Force directs the form and structure of every organism, so that any change in one part of it is but the index of changes which run visibly or invisibly throughout the whole. The growths between which we detect a correlation, are not really separate things connected only by the few correspondences which we may be able to detect, but are part and parcel of one operation, the result of one Force, exerting its energies through channels which we cannot see, and according to laws of which we can form but a distant and faint conception. The truth is that Correlation in this sense is involved in the very word "Growth." Each part of every structure which is the result of growth must be correlated to every other part. This

is essential to the very idea of growth, and to the very idea of an organism due to growth. When, therefore, Mr. Darwin says that one of the laws on which variation of form depends is Correlation of Growth, he simply says that variations of Growth depend on growth—for all growths must be correlated.

But Correlation in this sense helps but a little way indeed in conceiving the origin of a new Species. There might be the most minute and perfect harmony between the changes effected in an animal newly born without those changes tending even in the most remote degree towards the establishment of a new Form of Life. In order to that establishment there must be another correlation, and a correlation of a higher kind. There must be a correlation between those changes and all the outward conditions amidst which the new Form is to be placed and live. If this correlation fails the new Form will die. Yet, so far as we can see, this kind of correlation is without any physical cause. It is not necessarily involved, as the other kind of correlation is, in the very idea of Growth. On the contrary, it is not only entirely separable in thought, but, as we see in monstrosities, it is sometimes separated in fact. We have no conception of any Force emanating from external things which shall mould the structure of an organism in harmony with themselves. Mr. Darwin freely confesses this, and says that many considerations "incline him to lay very little weight on the direct action of the conditions of life" in producing variety of Form. We can conceive, dimly indeed, but still we can conceive, how in the Humming Birds a special form of Wing shall be correlated with a special form of Bill. But we have no conception whatever how a special form of Bill should be correlated with a special form of Flower from which the Bill is to extract its food. Mr. Darwin has shown how an improved Bill, when once produced, will be preserved by finding external conditions to which it is adapted. But he has not shown, and he frankly confesses he has no idea, how the adapted variation of Bill comes to be born at all.

Yet it is this higher and more complex Correlation which is the most constant and the most obvious of all the facts of Nature. In these facts we see that the forces of Organic Growth are worked under rules of close adjustment to external con-

ditions; and that particular shapes which might seem inseparably associated, if we looked at one Genus or one Family alone, are at once disjoined where different adaptations to Function are required. Let us take another example from the great Class of Birds. If we were to look only to the family of the *Anatidæ* (Ducks and Geese), we might suppose that there is a constant Correlation of Growth between webbed feet and spoon-shaped bills. But the real and efficient Correlation of Growth in this case is not between the spoon-bill and the web-foot, but between both of these and certain external conditions of life. The web-foot is correlated to an aquatic habitat: and the spoon-bill is correlated to spoon-food. And accordingly this association of form in foot and bill is at once dissolved where different external functions require a separation. In the Gulls, the Fulmars, and the Petrels, the web-foot is retained, because action upon the element of water is still required; but the correlated form of bill vanishes, and shapes altogether different are given,—shapes adapted, that is correlated, to different kinds of food, and to different methods of capture.

Again, there is another great family of Birds where some of the same forms are correlated with other forms entirely different, because of the different external Correlations which are required by Function. In the Divers the web-foot is mounted upon a flattened leg-bone, with the sharp edge set "fore and aft." Now what is this Correlation of Growth? It is, first, the Internal Correlation of those parts to each other, but secondly and principally, it is the External Correlation of both to their function of propelling under water. The form of the foot is correlated to the function of opposing the largest possible area of resistance to that medium, exactly where, for the purpose of swimming, the maximum of resistance is required; the knife-shaped leg-bone is correlated to the function of opposing the least possible resistance, precisely where, for the same purpose, the minimum of resistance is required. In Australia we have, in the *Ornithorynchus paradoxus*, the webbed feet correlated with the Duck-shaped Bill in an animal which does not belong to the Class of Birds at all.

There is another case of what may be called Correlated Correlations, which brings out very clearly the distinction which

is so important in the philosophy of this great subject. Feathers are a kind of covering peculiar to the Class of Birds. Under every variety of modification they have one fundamental plan—a central shaft or quill to which lateral filaments are attached. Now there is a vast range of correlations between the different kinds of feather and the different Families or Species, and between different parts of the body in the same Species. But there are two Correlations of Growth in respect to feathers which are constant. In all cases, (excepting, of course, the Wingless Birds,) the feathers which grow from the fore-arm and finger-bones, constituting the Wings, are comparatively long, strong, tapering, elastic, and with thin lateral filaments, which filaments are closely hooked together by means of minute teeth fitting into each other, so that the whole shall form one continuous surface or web. This is a Correlation of Growth between one particular kind of feather, and one particular member of the body, which, in all Birds capable of flight, is constant, and amounts to a universal Law. Now let us contrast this with another Correlation of Growth which is equally constant. On the side of the head of all Birds, there is a patch of feathers of peculiar structure, with fine and slender shafts, and with the lateral filaments not hooked together as in the other case, but, on the contrary, always separated from each other—the whole series forming a fine and open network spread over the surface which they cover and protect. These feathers cover the orifice of the ear, and are called the auriculars. They are correlated with the curious passages, the finely hung clapper-bones, and all the elaborate mechanism of that organ. Such are the Internal Correlations. But they are intelligible only when considered in the light shed by other correlations which are external. The wing feathers with close continuous webs are correlated to the laws by which the passage of air may be prevented—the auricular feathers, with open unconnected webs, are correlated to the laws by which the passage of sound may be rendered easy. The one set of feathers are adapted to the active function of evoking and resisting atmospheric pressure by striking strong, yet light and elastic blows, upon the air—the other set of feathers are adapted to the passive function of allowing the free access of the waves of sound into the passages of the ear.

These are but a few examples out of millions. Throughout the whole range of Nature the system of Internal Correlation is entirely subordinate to the system of External Correlation. Forms or growths which are inseparably joined with each other in one group of animals, are wholly divorced from each other in another group; whereas Forms which have correlations adapted to external conditions, are repeated over and over again across the widest gaps in the scale of Natural affinity.

If, then, it be true that New Species, are created out of small variations in the form of Old Species, and this by way of Natural Generation, there must be some bond of connection with determines those variations in a definite direction, and keeps up the External Correlations *pari passu* with the Internal Correlations. Natural Selection can have no part in this. Natural Selection seizes on these External Correlations when they have come to be. But Natural Selection cannot enter the secret chambers of the womb, and there shape the new Form in harmony with modified conditions of external life. How, then, are these external correlations provided for beforehand? There can be but one reply. It is by Utility, not acting as a Physical Cause upon organs already in existence, but acting through Motive as a Mental Purpose in contriving organs before they have begun to be. And where obvious utility does result, the only connecting Bond which can be conceived as capable of maintaining the Internal Correlations, in harmony with the External Correlations, is the bond of Creative Will giving to Organic Forces a foreseen direction. It is, in short, precisely the same bond which in all mechanism produces Structure in harmony with intended Function.

Hence it is that scientific men, in seeking expression for the ultimate ideas arrived at in the course of Physical research, find themselves compelled to borrow the language of Mechanical Invention. There is no other language which conveys an impression of the facts, or of the tie by which the facts are connected with each other. In the first chapter of this work I have had occasion to point out how true this is of Mr. Darwin's description of the Orchids, and of the curious functions of their structure. The correlations there are all external. But the same result appears in every other department of Science. In a

remarkable paper on the "Constitution of the Universe," Professor Tyndall has occasion to speak of the non-luminous rays of heat emitted by all incandescent bodies,—rays which, though intensely hot, are altogether insensible to the eye. Now the Retina of the eye is a piece of mechanism whose Correlations are essentially External. It is the expansion of a special nerve whose function it is to be sensitive to certain particular vibrations, and to no other vibrations whatever. Light itself, therefore, is discovered to be merely a relative term—a word, in short, denoting nothing but an external Correlation between the Retina and vibrations of a certain kind and quality. Now what is the language which Professor Tyndall is constrained to use in explanation of facts so difficult of conception? It is the language of Mechanism, of mental Purpose and Design. "It is not," he says, "the size of a wave which determines its power of producing light; it is, broadly speaking, *the fitness of the wave to the Retina.* The ethereal pulses must follow each other with a certain rapidity of succession before they can produce light, and if their rapidity exceed a certain limit, they also fail to produce light. *The Retina is attuned*, if I may use the term, *to a certain range of vibrations*, beyond which, in both directions, it ceases to be of use." These are indeed wonderful Correlations which reveal to us fittings and adjustments of which we had no previous conception: but they give us no glimmering, even, of knowledge as to the physical causes which have "attuned" a material organ so as to catch certain ethereal pulsations in the external world, and to make these the means of conveying to Man's Intelligence the enjoyment and the power of sight.

It will be seen, then, that when Mr. Darwin speaks of the Law of Correlation of Growth as a Law which determines variation in organic growths, he is really presenting to us under one phase two separate ideas which are radically distinct. One is the idea of different growths in the same organism, corresponding with each other in respect to arrangement,—or in respect to texture, or in respect to form,—or to some other point of comparison. The other idea is that these growths (each and all) correspond with the conditions of external nature in such a way as to fit them for the discharge of Function with some new adaptation, and consequently with some

new advantage. In one aspect the Law of Correlation of Growth is (or at least may probably be) a Law in the strictest sense of the word; that is to say, the result of a Force acting according to its own definite modes and measures of operation. But the Law of Correlation of Growth in the other aspect, is a law only in the sense (1) of an observed order of facts; and (2) of that Order depending on Adjustment with a view to Purpose.

Many naturalists have spoken of the facts of organic likeness as sufficiently accounted for by referring them to Adherence to Type. Mr. Darwin complains that this phrase, as an explanation of organic likeness, is no explanation at all, but amounts only to a re-statement of the facts in another form of language. This is true, but it is equally true of his own phrase of Correlation of Growth.* "Adherence to Type" is not in the nature of a Physical Cause, but in the nature of a Mental Purpose. It is no explanation, therefore, to those faculties of the mind which seek for Methods of operation. In like manner "Correlation of Growth," in the only sense in which it is possible to connect it with the Origin of Species, is not a Physical Cause, but a Mental Purpose. The physical means by which that purpose is secured remain as dark as ever; and such of them as are conceivable by us, are seen, like all other physical forces, working to order, subject to direction, and having that direction determined by foresight, forethought, and contrivance.

Correlation of Growth, in the sense of external adaptations, may be said to be the most universal of all the Laws of Nature. But it accounts for the Origin of Organic Forms only in the same sense in which it accounts for the origin of all other phenomena, which in their result exhibit adaptations, or fittings into use and service. Let us take, as an example, the origin, nature, and capacities of Coal. That substance is correlated in a truly wonderful manner with the needs, the powers, and the capacities of Man. It contains within itself, in a form condensed and portable, a store of physical Force of incredible

* Mr. Wallace traces the whole Darwinian theory to six "general laws of the simplest kind—laws which," he emphatically adds, "*are in most cases mere statements of admitted facts.*" Again he says, "This series of facts or laws *are mere statements of what is the condition of nature.*"—*Journal of Science*, No. XVI. p. 472.

amount. The particles of one pound weight of it are held together by a Force which, when liberated and applied in the form of heat, is capable of lifting one million times its own weight to the height of one foot.* No other substance known to Man is to be compared with this as a furnisher of Force. This is its function in the world. It is a function relating to Man's mechanical and inventive powers, and coal has been rendered capable of discharging this function by processes of preparation which began millions of ages before Man was born. But these External Correlations are a result arising by way of natural consequence out of certain physical causes working to order, that is to say, out of Internal Correlations of Growth between Solar Heat and Vegetable Structure, and again between these and the causes which occasion interchange between sea and land. No explanation so definite as this can be given of the method in which Vital Forces are made to evolve a new Form of Life. But even if such explanation could be given, it would render no account at all of the fittings of that Form into the outward requirements of its life. These are Correlations which in their very nature belong to Mind, are the work of Mind, and are intelligible only in the light of Mind.

I do not represent this conclusion as one necessarily adverse to Mr. Darwin's Theory on the Origin of Species. It is a conclusion which he would probably be willing to accept. I only desire to point out in how very limited a sense that Theory can be said to trace Creation to a "Law" at all, and how entirely inadequate that Theory is to account by any physical cause for the Origin of Species.

The only senses, therefore, in which we get any glimpse of Creation by Law are these—*1st*, That the close physical connection between different Specific Forms is probably due to the operation of some Force or Forces common to them all; *2d*, That these Forces have been employed and worked, with others equally unknown, for the attainment of such ends as the multiplication of Life, in Forms fitted for new spheres of enjoyment, and for the display of new kinds of beauty.

Is there anything in this conclusion to conflict with such

* "The Coal Question." W. S. Jevons, 1865.

knowledge as we have from other sources of the nature and working of Creative Power? I do not know on what authority it is that we so often speak as if Creation were not Creation unless it work from nothing as its material, and by nothing as its means. We know that out of the "dust of the ground"—that is, out of the ordinary elements of Nature—are our own bodies formed, and the bodies of all living things. Nor is there anything which should shock us in the idea that the creation of new Forms, any more than their propagation, has been brought about by the use and instrumentality of means. In a theological point of view it matters nothing what those means have been. I agree with M. Guizot, when he says that "Those only would be serious adversaries of the doctrine of Creation who could affirm that the universe—the earth, and Man upon it—have been from all eternity, and in all respects, just what they are now."* But this cannot be affirmed except in the teeth of facts which Science has clearly ascertained. There has been a continual coming-to-be of new Forms of Life.† This is Creation, no matter what have been the laws or forces employed by Creative Power.

The truth is, that the theory which fixes upon Inheritance as the cause of organic likeness, startles us only when it is applied to Forms in which unlikeness is more prominent than resemblance. The idea, for example, that the different kinds of Pigeon, or of Humming Birds, have all descended through successive variation from some one ancestral pair, whether it be true or not, would not startle any one. Yet, if this be true, we must be prepared for the same surmise extending farther. The advocates of Development urge that Time is a powerful factor. They say that if changes small, but constant enough, and definite enough, to constitute new Species, can and do arise out of born varieties, it is impossible to fix the limits of divergence which may be reached in the course of ages. It does not follow, on the other hand, that there is no such limit because we cannot fix it. It does not necessarily follow that because we admit the idea of the Rock-dove, and the Turtle-dove, and the Ring-

* "Méditations sur l'Essence de la Religion Chrétienne," p. 49.

† "We discern no evidence of a pause or intromission in the creation of coming-to-be of new plants and animals."—*Instances of the Power of God as manifested in His Animal Creation, by Professor Owen.*

dove being all descended from one ancestral Pigeon, we are bound to accept the idea of the Whale, and the Antelope, and the Monkey being all descended from some one primeval Mammal. Mr. Darwin says, truly enough, that Inheritance "is that cause which alone, as far as we positively know, produces organisms quite like, or nearly like, each other." But this is no reason why we should conclude that Inheritance is the only cause which can produce Organisms quite unlike, or only very partially like each other. We are surely not entitled to assume that all degrees and kinds of likeness can arise only from this single cause. Yet until this extreme proposition be proved, or rendered probable, we have a sound scientific basis for doubting the application of the theory, precisely in proportion to the unlikeness of the animals to which it is applied.

And this is the ground of reasoning, besides the ground of feeling, on which we revolt from the doctrine as applied to Man. We do so because we are conscious of an amount and of a kind of difference between ourselves and the lower animals, which is, in sober truth, immeasurable, in spite of the close affinities of bodily structure. Yet the closeness of these affinities is a fact; and it may with truth be said that in contrast with the gulf of separation in all resulting characters, these affinities are among the profoundest mysteries of Nature. Professor Huxley, in his work on "Man's Place in Nature," has endeavored to prove that, so far as mere physical structure is concerned, "the differences which separate him from the Gorilla and the Chimpanzee are not so great as those which separate the Gorilla from the lower Apes." On the frontispiece of this work he exhibits in series the skeletons of the Anthropoid Apes and of Man. It is a grim and grotesque procession. The Form which leads it, however like the others in general structural plan, is wonderfully different in those lines and shapes of Matter which have such mysterious power of expressing the characters of Mind. And significant as those differences are in the skeleton, they are as nothing to the differences which emerge in the living creatures. Huxley himself admits that these differences amount to "an enormous gulf,"—to a "divergence immeasurable—practically infinite." What more striking proof could we have than this, that Organic Forms

are but as clay in the hands of the Potter, and that the "Law" of Structure is entirely subordinate to the "Law" of Purpose and Intention under which the various parts of that structure are combined for use?

But Science will continue to ask, even if she never gets an answer, What is the community of physical cause which produces this community of resulting structure? The fact which it is most difficult to disengage from the theory of Development, or, in other words, from the theory of Creation by Birth, is the existence of rudimentary or aborted organs; the existence of teeth, for example, in the jaws of the Whale—teeth which never cut the gum, and which are entirely useless to the animal. We have an inherent conviction that this must have some use in the future,—that is, in some organism to be born from this one,—or else it must have had some use in the past,—that is, in some organism from which this one has descended. In either case the power of Inheritance is suggested to the mind. We think instinctively of the existence of some Derivative Form in which these teeth have been, or are to be turned to use. It is only fair towards the Theory of Creation by Birth, to admit that it does explain the existence of useless organs in a sense in which no other Theory explains them. It would be almost a necessary consequence of Creation by Birth, that there must be stages in which the ultimate use of new Forms could not be yet apparent. And if mere beauty or variety were in themselves objects which Creative Power sets before itself, then, also, we might expect to meet with modifications of structure having no other apparent use. Both these explanations, however, exclude Mr. Darwin's idea of Natural Selection; because this is a process which can never operate, except through the agency of actual use and disuse, upon organs already existing and capable of discharging function. The only theory of Creation by Birth which really does afford some explanation of the facts, is a theory which assumes modifications of structure to be entirely independent of the effect of actual use or disuse. Mr. Darwin himself candidly admits that in flowers, at least, the forces of Correlated Growth do "modify important structures independent of Utility, and therefore of Natural Selection." This admission must be extended to all organic growths. There must

have been a time with all of them when they began to be; and, therefore, a time before Natural Selection had room to play. These considerations, however, only serve to put a higher interpretation on the Theory of Creation by Birth. They do not condemn it.

One suggestion, indeed, has been made on this subject which I think it is impossible to accept. When men were yet unwilling to admit the existence of life and death upon the globe so long before the creation of Man, it used to be said that fossils were only "sports of nature." So in our own day, I have heard it said that rudimentary organs are merely intended to satisfy that condition of our finite minds in virtue of which we are unable to conceive Creation, except in connection with some History and Method of growth. And so, as a condescension to this weakness, aborted members are given to suggest a History which was never true, and a Method which was never followed! Now of one thing we may be sure, that there are no fictions of this kind in Nature, and no bad jokes. Whatever natural things really point to, they point to faithfully; and the conclusions really indicated are never false. Abortive organs mean something, and they mean it truly.

Still, there is no proof that Inheritance is the only cause from which such structures can arise. In the inorganic world we know that not mere similarity, but absolute identity of form, as in crystals, is the result of laws which have nothing to do with Inheritance, but of forces whose nature it is to aggregate the particles of matter in identic shapes. It is impossible to say how far a similar unity of effect may have been impressed on the forces through which vital Organisms are first started on their way. There are some essential resemblances between all Forms of Life which it is impossible even in imagination to connect with community of blood by descent. For example, the Bilateral arrangement is common to all Organisms, down at least to the Radiata, and in this great class we have the same principle of Polarity developed in a circle. Again, the general mechanism of the digestive organs by which food is in part assimilated and part rejected, is also common through a range of equal extent. Indeed, it may be said with truth, that never in all the changes of Time has there been any alteration through-

out the whole scale of Organic Life, in the fundamental principles of chemical and mechanical adjustment, on which the great animal functions of Respiration, Circulation, and Reproduction, have been provided for.* These are fundamental similarities of plan, depending probably on the very nature of Forces which necessitate these adjustments in order to the production of the phenomena of Life—Forces of which we know nothing, but which we have not the slightest reason to suppose to be due to Inheritance. Other similarities of plan may depend on the same laws, equally unconnected with Inheritance by descent.

Inheritance, indeed, has been suggested as the cause of organic likeness, mainly because there is a difficulty in conceiving any other. But there is at least an equal difficulty in conceiving the applicability of this cause to Man. We have already seen † that M. Guizot lays it down as a physical impossibility that Man—the human pair—can have been introduced into the world except in complete stature—in the full possession of all his faculties and powers. He holds it as certain that on no other condition could Man, on his first appearance, have been able to survive and to found the human family. Even those who question whether this argument is entitled to the rank of a self-evident physical truth, must admit that it is at least quite as good as the opposite assertion that any origin except the origin of natural birth is inconceivable. Where our ignorance is so profound, no reasoning of this kind is of much value. There is undoubtedly much to be said in support of M. Guizot's position. Certainly, Man as a mere animal is the most helpless of all animals. His whole frame has relation to his mind, and apart from that relation, it is feebler than the frame of any of the brutes. All its members are Correlated amongst each other with the functions of his Brain, so that action may follow upon Knowledge—so that embodiment may be possible to Thought. Yet in its plan and structure his frame is homologically, that is ideally, the same as the frame of the brutes—organ answering to organ, and bone to bone.

The words "Adherence to Type" are words expressive of an Idea, of a Purpose, which we see fulfilled in Organic Forms.

* Agassiz' "Geological Sketches," p. 41. London, 1860.
† *Ante*, page 28.

ut this purpose must have sought its own accomplishment by ıe use of means, and the question of Science always is, what ere these means? Love of beauty is equally a Purpose which e see fulfilled in Nature, but in the case of the Humming irds this has been accomplished by giving to their plumes the ructure of "Thin Plates,"—a structure which decomposes ght and flings back its prismatic colors to the eye. Fitness ıd special adaptation is another of the purposes of Creation, ıt this also is attained through the careful arrangement, and iability to use, of physical laws. In like manner, "Adher- ıce to Type" is the expression of a fact, or the statement of a urpose, which, like all the other purposes fulfilled in Nature, ıvites to an investigation of the instrumentality employed. 'e see the Purpose, but we do not see the Method. We see ıe purpose, for example, in the wonderful adaptability of the ertebrate Type to the infinite varieties of Life to which it ırves as an organ and a home. Science should be allowed ithout suspicion or remonstrance to pursue her proper object, hich is to detect, if she can, what the method of this work has ɛen. There is no point, short of the last and highest, at hich Science can be satisfied. Her curiosity is insatiable. It a curiosity representing man's desire of knowledge. But ıat desire extends into regions where the means of investiga- on cease, and in which the processes of Verification are of no ail. Above and behind every Detected Method in Nature ıere lies the same ultimate question as before—What is it by hich this is done?

It is the great mystery of our Being that we have powers im- elling us to ask such questions on the history of Creation, hen we have no powers enabling us to solve them. Ideas ıd faint suggestions of reply are ever passing across the outer mits of the Mind, as meteors pass across the margin of the mosphere, but we endeavor in vain to grasp or understand ıem. The faculties both of reason and of imagination fall ack with a sense of impotence upon some favorite phrase— ɔme form of words built up out of the materials of analogy, ıd out of the experience of a Mind, which, being finite, is not reative. We beat against the bars in vain. The only real ɛst is in the confession of ignorance, and the confession, too,

that all ultimate physical Truth is beyond the reach of Science.* It is probable that even the nearest methods of Creation, though far short of ultimate truths, lie behind a veil too thick for us to penetrate. It is here surely, if it is anywhere in the sphere of natural investigation, that the Man of Science may lay down the weapons of his analysis, and say, "I do not exercise myself in great matters, or in things which are too high for me." †

There is at least one conclusion which is certain, namely, this —that no theory in respect to the means and method employed in the work of Creation—provided such theory takes in all the facts—can have the slightest effect in removing that work from the relation in which it stands to the attributes of Will. All such theories are, and can only be "simply questions of how the Creator has worked." This is the confession made in respect to Mr. Darwin's theory by one of the most competent of its supporters.‡ Creation by Law—Evolution by Law—Development by Law, or, as including all those kindred ideas, the Reign of Law, is nothing but the reign of Creative Force directed by Creative Knowledge, worked under the control of Creative Power, and in fulfilment of Creative Purpose.

* I have slightly altered this passage as it stood in the earlier editions, because, although the context clearly indicates its reference to Physical truth, it has been quoted by Mr. Lewes as granting all that the Positive Philosophy demands. There is a sense of course, in which it may be said that no Truth knowable by man can be "ultimate." That is to say, there is no Truth even conceivable, respecting which we might not ask, or desire to ask, farther questions. But there is no use in appearing to agree with those from whom in reality I so widely differ. The definition of Truth which Mr. Lewes would consider "ultimate," and therefore unattainable, is very different from the definition which I should give, and have given.

† Psalm cxxxi.

‡ Mr. Wallace.—*Journal of Science*, No. XVI. p. 473.

CHAPTER VI.

THE REIGN OF LAW IN THE REALM OF MIND.

WHEN we pass from the phenomena of Matter to the phenomena of Mind, we do not pass from under the Reign of Law. Here, too, facts do range themselves in an observed Order: here, too, there is a chain of cause and effect running throughout all events: here, too, we see around us, and feel within us, the work of Forces which have always a certain definite tendency to produce certain definite results: here, too, it is by combination and adjustment among these Forces that they are mutually held in check: here, too, accordingly, special ends can only be accomplished by the use of special means.

But then the question immediately occurs to us—can we speak of Law, or of Force, or of "cause and effect," as applied to the phenomena of Mind, in the same sense in which we speak of them as applied to the phenomena of Matter? Is it only by distant analogy, or as expressing ideas really the same, that we use the same terms of both?

Undoubtedly the first thought which suggests itself to the mind is, that a material Force and a moral or intellectual Force are essentially different in kind,—not subject to conditions the same, or even similar. But are we sure of this? Are we sure that the Forces which we call Material are not, after all, but manifestations of mental energy and Will? We have already seen that such evidence as we have is all tending the other way. The conclusions forced upon us have been these:—first, that the more we know of Nature the more certain it appears that a multiplicity of separate forces does not exist, but that all her forces pass into each other, and are but modifications of some One Force which is the source and centre of the rest: secondly, that all of them are governed in their mutual relations by principles of arrangement which are purely mental: thirdly, that of the ultimate seat of Force in any form

we know nothing directly: and fourthly, that the nearest conception we can ever have of Force is derived from our own consciousness of vital power.

If these conclusions be true, it follows that, whether as regards that in which Force in itself consists, or as regards the conditions under which Force is used, it need not surprise us if in passing from the material world to the world of Mind, we see that Law, in the same sense, prevails in the phenomena of both. But as this is a subject of much difficulty, and of much importance, it may be well to examine it a little nearer.

The first and most palpable form in which we see that Mind is subject to Law, is in its connection with the Body. And this connection is so close that we know neither where it begins nor where it ends. The extent and nature of it can be known only by the same kind of reasoning and observation by which we attain to any knowledge of the external world. For indeed our Bodies seem part of the external world to us. We see their form as we see the form of other things, but we do not see their structure, neither do we feel it, nor can we arrive at it, except as a matter of obscure and difficult research. It is literally true that some of the most distant objects in the Universe are more accessible to our observation, and in some respects more intelligible to our understanding, than the material frame in which we live. Man had discovered much concerning the circulation of the Planets before he had discovered anything concerning the circulation of his own blood.* Yet so near is the current of that blood to him, so much is it a part of himself, that when it stops, in an instant "all his thoughts perish." Nevertheless, the Mind is not conscious of its own dependence on material organs. Even in respect to those exertions of the Will which are expressed in movements of the Body, we are conscious only of the Will, and of the Will being exerted with success; but we are entirely unconscious of the machinery, which intervenes between the intention and the accomplishment of the act intended. Such movements of the Body appear to us as if they were direct acts of Will. Yet nothing can be more certain than that the communication is

* Kepler and Harvey were contemporaries; but Copernicus had preceded them by nearly a hundred years.

not direct but indirect—and even elaborately circuitous. It is only when the ropes and pulleys are broken that we discover how that which we call our Will can only run in appointed channels—which channels are material, and are laid down upon a plan, like conducting wires, as if for the conveyance of a material Force.

Nor does it end here—this close connection between Mind and Matter. So far from being less close, it seems to be only closer and closer when we pass to mental operations in which no apparent movements of the Body are concerned. In the exercise of pure Reason, in passing from one mental conception to another, when by an effort of our Will we turn our attention to a new question, and in the twinkling of an eye pursue a fresh train of thought,—above all, when our affections go forth towards those who are the objects of them—in all these operations, if anywhere, we feel as if we were free from mechanism—from "organs"—from Matter in any form. So it seems till we are brought face to face with the terrible phenomena of disease. Then our delusion is dispelled, and we know how frail we are. Then we find that the same stroke which paralyzes the movement of a limb, may paralyze, not less effectually, all the powers of Reason, of Memory, and of Will. And the Affections,—what becomes of them? These too, which seem so purely spiritual, we find out to be dependent on material structure. Every physician knows that a frequent consequence of cerebral disease is a total change of character. There is no symptom of insanity more common than the growth of dislike and aversion to those who, in health, had been the most loved on earth. Change of every kind and degree in the character and structure of Mind is the immediate result of corresponding changes in the structure and substance of the Brain. The pure may become impure, the loving may become malignant; the simple-minded may become suspicious; the generous may become engrossed with self, the strong-minded may become imbecile,—the whole man may be broken down, and may live for years without consciousness and without emotion. How painfully does the Brain sometimes indicate its functions! What is it in the aspect of Idiotcy, in many of its forms, which we instantly recognize, and never can mistake? In that low,

pinched, and retiring brow, we see instinctively that Reason cannot hold her seat. These facts do not stand alone. Not only are there some parallel facts, but all the living world is full of them. The whole range of animal creation, from Man down to the Reptile and the Fish, testifies to the universal law of an ascending scale of mental capacity being coincident with an ascending degree of cerebral organization. No series of facts, tending to the establishment of any physical truth, is more complete or more conclusive than the chain which connects the functions of the Brain with the phenomena of Mind.

But here, again, let us beware of the fallacies which may arise from a failure to recognize the exact import of the words we use. In the ears of many it sounds like Materialism to say that Thought is a function of the Brain. But it has been already shown in a previous chapter that Function is merely the word by which we describe that work which any given piece of mechanism has been adjusted to perform. The Power, or Force, which is developed by means of an "organ," is not identical with that organ, nor with any of its parts, nor with the materials of which it is composed, nor even with its mechanism as a whole. It does not follow, for example, that Electricity is identical with the tissues of a fish, because it is developed out of the battery of a Torpedo or a Gymnotus. Yet it is true that the development and discharge of Electricity is the "function" of those Fish-organs:—that is to say, this is the work which they have been adjusted to perform. Still less do we confound Thought with Brain when we acknowledge the fact that Brain in our Organism is inseparably connected with the power of thinking.

Yet inferences as false as this, and very nearly related to it, have actually been drawn by eminent men from the facts of cerebral action. Thus it has been declared that a knowledge of Brain, under a name which is in itself a fallacy—Phrenology—is the only sure foundation of Mental Science. This is a mere confusion of thought, even if the phrenological mapping of the Brain were as certainly correct as it is really doubtful. That particular faculties of the Mind may be connected with particular portions of the Brain, is not in itself more difficult to understand or to believe than that the Mind, as a whole, is connected with the Brain as a whole. Whether it be so or not is a ques-

tion purely of observation and of fact. But this, at least, is certain,—that the different faculties and affections of the Mind must be discriminated from each other before it is possible to assign to them a local habitation. The Mind must be mapped first, and then its Organ. No additional knowledge is given to us of any one mental faculty, by proving that it is connected with some special bit of the mysterious substance of which that organ is composed. Love is Love, and nothing else; Hatred is Hatred, and nothing else; Reverence is Reverence, and nothing else; the pure, intellectual perception of a Logical Necessity is itself, and nothing else;—however clearly it may be proved that each of these is a function of some separate region of the Brain. When the phrenologist, taking in his hand a human skull, and lifting its upper cover, tells us that the oval of convoluted matter which is thus exposed to view "manifests the moral sentiments," what light does he throw on these? The moral sentiments!—what do these include? The power of seeing Moral Beauty, and of loving Truth—the sense of Justice, and the desire of serving in her cause—Conscience and Benevolence, Charity and Faith—all that is best and noblest in the human spirit—these are "manifested" in that bit of Matter! What new information does this give us on the nature or the office of those glorious attributes which are the joy of Earth and Heaven? None at all. They are just what we knew them before to be.

Phrenology is no longer popular, as it once was, among Physiologists. Its mapping of the Brain is now generally admitted to be imaginary. But the fundamental error of the Phrenological School did not lie merely, or even mainly, in any mistake as to the mapping of the Brain. It lay in the idea that a Science of Mind can be founded in any shape or form upon the discoveries of anatomy. Their error lay in the notion that Physiology can ever be the basis of Psychology. And this is an error, and a confusion of thought, which survives Phrenology. A profound interest indeed attaches to every new fact which connects together the parallel phenomena of Mind and of Organization. But it is the phenomena of Mind, and it is these alone, of which we are directly cognizant, and it is from these that we must start as the basis of all Psychological research.

This is true even of those phenomena of the mind which are most purely animal. Sensation, for example, may be traced with absolute demonstration to certain nerves. This may throw a new light on the method by which Sensation is rendered possible; but it throws no new light whatever upon what Sensation is. It is that which we know and feel it to be, and it is neither more nor less since the knife of the anatomist has laid bare the channels along which it comes. Still more is this true of the Intellectual Powers. Yet there are Philosophers who appear to think that some new light is cast upon Sensation when they call it an affection of the "Sensory Ganglia;" that Thought is in some measure explained when it is called "Cerebration," and that the Laws of Intellect are reduced to scientific expression when they are described as the working of the "Cerebral Ganglia." All this is a mere idle play on words. It is an attempt to put that first which must be last, and that last which must be first. The general fact of the dependence of Mind on a Bodily organization is a fact which contains within itself all the lesser facts of Physiological discovery. They are not, and they cannot be, new in kind. They do not even help us to conceive how, through any mechanism, the power of Thought can be evolved. Still less do they give us any new view of that which Thought, in itself, is.

This connection, therefore, between Mind and Brain, although it is a universal "law" of our being, is a law recognized by us only in the sense in which Law is applied to "an observed Order of facts." But like every other Order of this kind, it implies a Force or an arrangement of Forces out of which the Order comes. It implies, too, that this arrangement of Forces is necessary to the evolution and play of mental faculties in the form in which they are possessed by us. Consequently these faculties are seen taking their place among all the other phenomena of the world. They are seen to be under the Reign of Law in this largest and highest sense of all—that they depend upon Adjustment, and that adjustment so delicate that the slightest disturbance of it deranges the whole resulting phenomena of Mind. Mind, as developed in us, has its very existence and working dependent on imperative physical conditions, which conditions are met only by elaborate contrivance.

We have no knowledge what the Forces are which demand this obedience, and which call for this contrivance. We have even an insuperable difficulty in conceiving what they can be. It almost seems as if there were a barrier in the very nature of our minds against the possibility of conceiving how any combination of material forces can either result in Mind, or can be necessary to the working of its powers, or can be concerned even in giving it an abode.* "We cannot conceive," says Dr. Andrew Combe, "even in the remotest manner, in what way the Brain—a compound of water, albumen, fat, and phosphate salts—operates in the gènerating of Thought." And yet there is one experience which brings the fact of this close connection within the direct recognition of Consciousness. We know and feel that the act of severe thinking is attended with the expenditure of Force. The close, steady, continuous application of the mind to any subject requiring the exercise of our higher intellectual faculties, is well known to be "hard work." Without causing any bodily movement of which we are conscious, it produces, nevertheless, bodily exhaustion. It occasions the expenditure of a physical force, or at least of a force for which we have no other name. It is not uncommon for men of great age to be able to exert undiminished powers of mind for one or two hours, and then to lapse into comparative imbecility. Thus the exertion of the Brain is like the exertion of a muscle, and is attended with the same effects. There is fatigue; and with excessive fatigue the power of motion stops.

Yet such facts as these only puzzle us—they do not help us to any clear idea of the nature or manner of a connection which is indeed incomprehensible. We know of Mind only as itself, and as nothing else. The difference between it and all other things seems infinite and immeasurable. No doubt this difficulty, or at least part of it, arises not from any misconception as to what Mind is, (for of this our knowledge is direct,) but from a misconception as to what Matter is—and what the Forces are which we call material. Close analysis of the phenomena of Nature, and of our own ideas in regard to them, has already

* "Aperta simplexque mens, nullâ re adjunctâ quæ sentire possit, fugere intelligentiæ nostræ vim et notionem videtur."—Cicero, "De Nat. Deor." lib. x. c. 11.

This is true only in one sense. It is very far from being true, that the connection between Mind and Matter is a necessity of thought.

prepared us to believe, that these Forces which work in Matter and produce in us the impressions from which we derive our conceptions of it, are themselves immaterial, and can be traced running up into a region where they are lost in the light of Mind. The Christian doctrine of the Resurrection of the Body sanctions and involves the notion that there is some deep connection between Spirit and Form which is essential, and which cannot be finally sundered even in the divorce of Death. The affections hold to this idea even more firmly than the intellect. Hence the noble and passionate exclamation of the Poet—

> "Eternal Form shall still divide
> The Eternal Soul from all beside,
> And I shall know him when we meet."
>
> "*In Memoriam*," xlvi.—TENNYSON.

But this first sense in which Mind is under the Reign of Law —that is, its dependence on the Body, prepares us for yet other senses in which it lies under the same dominion. The very fact that the Mind is itself unconscious of its dependence upon Matter, and of the manner and conditions of its connection with "organs," teaches us that there is a large class of phenomena connected with Mind, of which we should be entirely ignorant if we trusted to the direct evidence of Consciousness alone. This ought not to inspire us with any distrust of Consciousness in those matters in which it is a competent and indeed the only witness. But there is a large class of phenomena of which Consciousness properly so called, that is, the direct perception of the Mind of its own present workings, does not inform us. The Mind looking in upon itself sees itself only, and does not see either the mechanism through which it is able to work at all, nor many of the forces which operate in it and upon it. These, some of them at least, can only be arrived at by the same processes of reasoning and observation which we apply to the external world, and by which we ascertain the action and reaction of involuntary agents.

There is nothing of which it is so difficult to persuade ourselves as of this. In the apprehension of Consciousness the sense of Will is so strong within us that it blinds us to the insuperable conditions which limit both what we will and what we do. That

our Wills, of whose freedom we are conscious, should often be determined by influences of which we have no consciousness at all; that our opinions should as often be the result of causes and not of reasons; that our actions should follow a course marked out by conditions which we fail to recognize as having any determining effect upon them—these are conclusions against which we are apt to rebel—as depriving us of a part of our free and intelligent agency. Hence the indignation with which men resent being told that they have been impelled by motives other than the motives which are avowed, and other than the motives which are consciously entertained. Yet the fact of their being so impelled is often perfectly plain to those around them. The reply, however, is always ready: "You seem to know my motives, and the causes of my conduct better than I know them myself,"—as if the proposition so stated were evidently absurd. But it is, on the contrary, a proposition which may well be true. Bystanders very often see the forces telling upon our Will much more clearly than we see them ourselves. It is possible, indeed, by a vigorous effort of self-analysis to see all that others see, and a great deal more. Those who are able really to look in upon themselves, can often detect the influences which have been acting on their minds, coloring their opinions, and determining their conduct in a degree which the higher faculties would be glad to disown and disavow. There is nothing more wonderful in the constitution of our minds than the power we have of standing aside, as it were, for a time, from the ordinary channel of our own thoughts, and of looking back upon their currents coming down from the hills of Memory and Association to join their issues in our present life. But this sort of looking in upon ourselves, and treating ourselves as a subject of natural history, is to all men a difficult, and to most men an impossible, operation. They have neither time for it nor thought for it. The conscious energies of the Will are so near us, and so ever present with us, that they shut out our view of the forces which lie behind. Yet there are some facts common in the experience of all men which may help us to a conception of the truth. One of these is the fact of Mind growing with the growth of years—a fact determined by the recollection of childhood, of youth, and of maturity. By compar-

ing ourselves with ourselves at former periods of life—by the memory of feelings, and of opinions, and of methods of thought which we have outgrown and left behind us, we can detect the action of forces which have told upon our minds—traces, in short, of the laws to which they have been subject. Some of these laws have been nothing more than laws of physical growth —the conceptions of the Mind undergoing a development consequent on the growth of our Material Organism.

Another fact bearing on the same question, but which is more easily observed in others than in ourselves, is the frequent determination of mental qualities by hereditary transmission. The famous question, as to the Origin of our Ideas, and how far they are due respectively to Experience, to Association, or to Intuition, has been discussed by Metaphysicians with far too little reference to the organic phenomena which are so closely related to the phenomena of Mind. It is not true, indeed, that Psychology is subordinate to Physiology, but it is true that these two are so intimately connected, that neither is independent of the other. Man is not a disembodied Spirit, but a Being whose mental powers are subject to the laws of a material organization. And so it is that almost every fact in Physiology has an intimate bearing on some question or other in the Philosophy of Mind. No better illustration could be given than one which arises out of this question of the Origin of our Ideas. In one of the many formulæ of expression to which Mr. J. S. Mill has reduced the assertion that Experience is the source and origin of all our thoughts and actions, he is obliged to except from the sweep of that assertion the voluntary movements of the Body. He says, "We bring about any fact, *other than our own muscular contractions*, by means of some other fact which *experience has shown* to be followed by it." * Now let us observe the immense significance which attaches to this exception. Why is Mr. Mill compelled to make it? Because he mixes up in one assertion two propositions which are totally distinct, one being true universally, and the other being true only partially. The first proposition is, that all facts which we can "bring about," must be so brought about by the use of means. This is true universally. The second

* "Auguste Comte and Positivism," by J. S. Mill, p. 7.

proposition is, that we are guided to the knowledge of those means by Experience alone. Now, this last proposition is not true, as Mr. Mill is obliged to confess, of the whole class of facts which are brought about by vital effort. But the muscular contractions of the Body are no exception whatever to the mere general affirmation that all actions must have a cause, or in other words, must be brought about by the use of means. Exceptions they are, however, to the affirmation that the nature of those means is made known to us by Experience. The sentence, in so far as it asserts the universal Law of Causation, might have been so framed as to require no abatement or exception whatever. "We bring about any fact by means of some other fact which we know either by experience *or by Intuition* to be followed by it." In this form the sentence is absolutely true, and applies to "our own muscular contractions," as well as to every other action. But philosophers who support the doctrine of Experience do not like the word "intuition;" and though they cannot do without it altogether, they use it as seldom as they can. They feel very naturally, and very truly, that if Intuition be admitted in regard to the ultimate phenomena of Volition, the idea will not easily be dispelled that Intuition may extend also to the ultimate phenomena of Thought. Now the muscular contractions of the Body stand at the very fount and origin of all we do; and it is more than probable that analogous movements of the Brain stand as near to the origin of all we think.

The bearing of this question on the Philosophy of Mind cannot be mistaken. The muscular contractions of the Body are of two kinds—one kind is constant, automatic, and lasting with the duration of life itself. The other kind is intermittent, voluntary, and capable of being destroyed whilst the Consciousness, and the Intelligence, and the Will are still in use. Both these kinds of action are rendered possible by the use of means: but it is only in the case of one of them that those means are placed at the bidding of the Will. Yet it is not Experience which teaches us how to use those means. It is purely Instinct or Intuition. We are not even conscious of the very existence of the means which we employ, and the profoundest researches of Science do not even yet give us the faintest notion what

their ultimate nature is. No experience whatever is required to teach a child how to extend its limbs or how to exert its voice. Nevertheless, neither of these things can be done except through the use of means. The only difference between these actions and actions of a more complicated kind is, that the appropriate means are resorted to and employed by Intuition. The Will which moves the limbs, and moves them through the use of a complicated machinery, is born with the Organism of which that machinery forms a part, and has an instinctive knowledge how to use it. Now, it is against the analogy of Nature to suppose that this great class of facts respecting the powers of the Body are without some corresponding facts respecting the powers of Mind. Indeed, all vital phenomena of this kind are in themselves necessarily phenomena both of Body and of Mind. The close connection which exists between the two, and the inseparable analogies which unite all their workings, render it therefore almost certain that the Mind is to be regarded as having both kinds of movement which the physical Organism possesses—that is, faculties which are automatic in their action—and other faculties which, though subject to direction by the Will, yet work upon the materials presented to them in a manner strictly intuitive and independent of all experience.

And as the abnormal phenomena of disease, or of malformation, often throw an important light on the structure of the body, so do certain abnormal intellectual phenomena give us strange glimpses occasionally into the powers of Mind. Among those phenomena, none are more curious than the intuitive powers of numerical computation which a few individuals have possessed. There are well attested cases of this power in virtue of which the mind reaches the result of difficult calculations by a species of Intuition—that is to say, without any consciousness of the process by which that result is made apparent to the Mind. This is not a proof that there is no process, but only that it is a process gone through as a machine goes through a process—that is, according to its own pre-adjusted laws of Motion. Perhaps, indeeed, this process may not be different in kind from the process by which the average mind reaches the most elementary of arithmetical truths. The product of one and one,

or of two and two, may be self-evident to all of us only in the same way in which the product of a long series of figures may be self-evident to minds with an abnormal gift of the arithmetical faculty. Thus the distinction breaks down between self-evident truths and truths which are not self-evident. A truth may be self-evident to one mind which is not self-evident to another, but may require, on the contrary, a laborious process of verification. And does not this again lead us to see how entirely dependent are the phenomena of Mind upon the power of special Faculties, and how this power is itself dependent on the Adjustments of Organization? In the world of Physics, we know that we are surrounded by movements which never make themselves sensible to us—pulsations which excite in our eyes no sense of light—and others which excite in our ears no sense of sound,—and all this for want of adjusted organs. And so it would seem as if the Mind of Man were an Instrument attuned only to a certain range of knowledge, but as if within that range it were capable of finer and finer adjustments to the harmonies of Truth. These cannot make themselves heard where there is no organ to catch the sound. Nor could that organ translate them into Thought—into that conscious apprehension of which an Idea essentially consists,—had it not its own preadjusted relation to the Verities of the World.

It must be remembered, however, that in the discussion of such questions as to the Origin of our Ideas, there has been a great want of definition in the use of terms. Are fear, and love, and hatred, and anger, and jealousy, and remorse, and joy,—are these "ideas," or are they only conditions or powers of mind? If by Ideas we mean those imaginings which, as the very word implies, involve "images" of external things, it is certain that contact with external impressions, and, in this sense, Experience, is essential to the formation of them. But if by Ideas we mean the elementary passions, or if we mean even those peculiarities of thought—those special tendencies of mind which lead us to view things in some particular light rather than in others, and which constitute the essential distinction between the ideas of different men—if, in short, we include in the term anything which belongs to the Thinking Faculty itself, or anything of the method according to which it works up the raw material of

Thought—then it is equally certain that Ideas in this sense are born with all of us, and that Imitation, and Experience, and Association, do but pour their material into moulds already cast for their reception.

But in reality here, as in many other questions, the rival disputants have each had some portion of the truth. They have been both right and both wrong. An Idea is not a simple, but a composite thing. It has not one origin, but a plurality of origins. An Idea is, as it were, a fabric of which the threads come from the spinner, and the weaving from the loom. Or it is, as it were, an organic growth, of which the materials are supplied from the external world, and the structure from the world within. There are many elements in every Idea which come, and can only come, from without. There are other elements, and among them the Formative Power, which come, and only can come, from within. The Mind stands in pre-established relations to the things around it—bound to them by the infinite adjustments which may be called External Correlations of Growth. Out of these relations it is not itself, nor do its powers possess the materials whereon to work. We cannot conceive a mind having no points of contact with the external world. From that world must come all the exciting causes of Thought and of Emotion. But the form into which these are cast—the tissue into which these are woven—the force by which Ideas become a Power—all, in short, that constitutes Thought as distinguished from the things about which we think—all this comes from, and belongs to, the Mind itself.

Among the lower animals, young ones, taken from the litter or the nest, and brought up under conditions wholly removed from the teaching of their parents, whether by imitation or otherwise, will reproduce exactly all those habits of their race which belong to their natural modes of life. Many of these habits, perhaps it may be safely said all of them, imply Ideas —that is to say, they imply instincts; and instincts are in the nature of ideas—that is to say, they belong to the phenomena of Mind. And of this there is another indication in a fact which at first sight may seem trivial or irrelevant. It has been often said that one great difficulty in reasoning on this subject, is the inaccessibility to observation of the mental condition of

all infant creatures. But even if this were more true than it really is, there are some creatures, not low in the scale of creation, of which it may be said that, comparatively, they have no infancy at all. These are the Gallinaceous Birds in general, and some Species in particular. They come forth from the egg perfect miniatures of their parents, and with minds as fully equipped with parental instincts as their bodies are provided with feather or their wings with quills. Antecedent to all experience of injury, they exhibit fear, and not only fear, but fear of the proper objects. They will flee when they see a hawk, and they will carefully avoid a stinging insect. In Europe the young of the Woodgrouse or Gelinotte are able to fly from the moment they break the shell. In Australia, and the great group of islands which connect Australia with the Asiatic continent, there is a still more curious example of the same fact. There is a Family of Birds (*Megapodidæ*) of which the young are hatched, not by the incubation of the parents, but by the heat of fermentation generated in earthen mounds, scraped together for the purpose. From the moment the young are hatched they feed themselves, and run, and fly, and roost on trees, as if the world on which they have just opened their eyes had been long familiar. It is said, indeed, that the Parent Bird watches the Hatching Mound, and is ready to escort the chicks upon their first appearance in the surrounding scrub. But the recognition of the Parent by the young, and the answer to her call, are the most remarkable of all among these proofs of intuitive ideas. "As a moth emerges from a Chrysalis, dries its wings, and flies away, so the young Telegallus, when it leaves the egg, is sufficiently perfect to be able to act independently.* Nor is this all; the curious instinct by which the Bird prepares an artificial Incubator for its young is an instinct born with it—an Innate Idea expressing itself in congenital habits of body. The chick of another Species of this singular family of Birds, the Megapode, was found in confinement to be incessantly scraping up sand and gravel into heaps, and the rapidity and power with which it effected this operation is described with astonishment by its captor.

These may seem far-fetched illustrations, and of slight value

* Gould's "Birds of Australia."

in so dark a subject; but let us remember that there are no solitary facts in Nature. There are indeed extreme cases,—extreme examples of universal laws,—that is to say, of laws whose operation is ordinarily restrained within narrower limits. But there is no fact standing really alone—not one which is not bound to the whole Order of Nature by deep analogies. That any creatures should be ushered into life so completely organized and furnished as the young of the Gallinaceous Birds and of the Megapodes, is a fact of immense significance in the phenomena of Organic Life. (See note E.)

In Man analogous facts appear, modified by his infinitely wider range of character, and the infinite degrees in which the different elements of Mind are capable of being mixed in him. But although these conditions greatly complicate the result, the general phenomena are the same. Orphans, who have never had any opportunities of acquiring, by imitation, the peculiarities of their parents, will often, nevertheless, reproduce these peculiarities with curious exactness. This is a familiar fact, and how much this fact implies! Even when the inheritance is merely some congenital habit of body, or some trick of manner, it may, probably, imply some resemblance deeper than appears. For the Body and the Mind are in such close relationship, that congenital habits of Body are sure to be connected with congenital habits of Mind. But the inheritance is very often, so far as we can see, purely mental. How often do we recognize the tone, character, and the very turn of thought of dead friends, in the conversation and conduct of their children! The innate tendency to look at things in the same point of view, is evidenced in the reproduction of the same mental combinations, of the same images, of the same opinions, in short, of the same ideas. Cases, more remarkable than others of this kind, attract our attention, and we at once recognize ideas as innate which are so obviously determined by the forces of hereditary transmission. But we forget how often these laws of inheritance must be working invisibly where they never break ground upon the surface. And thus it is brought home to us how the Mind may be subject to laws of which it is unconscious—how its whole habit of thought, and the aspect in which different questions present themselves to its apprehension, are

in a great measure determined by the mysterious forces of congenital constitution. And what is true in one measure of the individual mind, is true, also, in other measures, of whole families and of races of Men.

But the laws of Material Organization are not the only laws to which Mind is subject. Obscure as these laws are, there are others which are obscurer still. What we cannot see in detail, we can see in the gross. What we cannot recognize in ourselves, we are able to recognize in others. We can see that the actions and opinions of men, which are the phenomena of Mind, do range themselves in an observed Order, upon which Order we can found, even as we do in the material world, very safe conclusions as to the phenomena which will follow upon definite conditions. And when we go back to former generations—to the history of nations, and the progress of the human race—we can detect still more clearly an orderly progress of events. In that order the operation of great general causes become sat once apparent. On the recognition of such causes the Philosophy of History depends; and upon that recognition depends not less the possibility of applying to the exigencies of our own time, and of our own society, a wise and successful legislation.

But what are these causes, and what is the nature of those "laws" to which voluntary agents are unconsciously obedient? Is man's Voluntary agency a delusion, or is it, on the contrary, just what we feel it to be, and is it only from misconception of its nature that we puzzle over its relation to Law? We speak, and speak truly, of our Wills being free; but free from what? It seems to be forgotten that Freedom is not an absolute but a relative term. There is no such thing existing as absolute freedom—that is to say, there is nothing existing in the world, or possible even in thought, which is absolutely Alone—entirely free from inseparable relationship to some other thing or things. Freedom, therefore, is only intelligible as meaning the being free from some particular kind of restraint or of inducement to which other beings are subject. From what, then, is it that our Wills are free? Are they free from the influence of motives? Certainly not. And what are motives? A motive is that which moves, or tends to move, the mind in a particular

direction. Like all other words which are used to describe the phenomena of Mind, it is taken from the language applicable to material things, and suggests the analogies which exist between them. It belongs to the profound but unconscious metaphysics of Human Speech. That which moves the Mind in a particular direction is best conceived of as something which exerts a force upon it, and the aggregate of such forces may, in a general sense, be called the laws which determine human action and opinions.

But here we come upon the great difficulty which besets every attempt to reduce to system the laws or forces which operate on the Mind of Man. It is the immense, the almost boundless variety and number of them. This variety corresponds with the variety of powers with which his Mind is gifted. For pre-established relations are necessary to the effect of every force whether in the material or in the moral world. Special forces operate upon special forms of matter, and except upon these, they exert no action whatever. For no force can operate except where there are pre-established relations between its energies and the things upon which its energies are to work. The Polar Force of magnetism acts on different metals in different degrees, and there is a large class of substances which are almost insensible to its power. In like manner there are a thousand things that exercise an attractive power on the mind of a civilized man, which would exercise no power whatever upon the mind of a savage. And in this lies the only difference between subjection to Law under which the lower animals are placed, and the subjection to law which is equally the condition of Mankind. Free Will, in the only sense in which this expression is intelligible, has been erroneously represented as the peculiar prerogative of Man. But the Will of the lower animals is, within their narrow spheres of action, as free as ours. A man is not more free to go to the right hand or to the left than the Eagle, or the Wren, or the Mole, or the Bat. The only difference is, that the Will of the lower animals is acted upon by fewer and simpler motives. And the lower the organization of the animal, the fewer and simpler these motives are. Hence it is that the conduct and choice of animals—that is, the decision of their Will under given conditions—can be predicted with

almost perfect certainty. Their faculties, few in number and limited in range, are open only to the small number of forces which are related to them; and in the absence of higher faculties accessible to other motives, these few attractions exert a determining effect upon their Will. (See note F.)

Accordingly we may see that, in proportion as there is an approach among the lower animals to the higher faculties of Mind, there is, in corresponding proportion, a difficulty in predicting their conduct. Perhaps the best illustration of this is a very homely one—it is the effect of baits and traps. Some animals can be trapped and caught with perfect certainty; whilst there are others upon which the motive presented by a bait, is counteracted by the stronger motive of caution against danger, when a higher degree of intelligence enables the animal to detect its presence. Yet the Will of the cunning animal is not more free than the Will of the stupid animal,—nor is the Will of the stupid animal more subject to Law than the Will of the cunning one. The Will of the young Rat, which yields to the temptation of a bait, and is caught, is not more subject to Law than the Will of the old Rat, who suspects stratagem, resists the temptation and escapes. They are both subject to Law in precisely the same sense and in precisely the same degree—that is to say, their actions are alike determined by the forces to which their faculties are accessible. Where these are few and simple, the resulting action is simple also; where these are many and complicated, the resulting action has a corresponding variety. Thus the conduct of animals is less capable of being predicted in proportion as it is difficult or impossible to foresee the nature or number of the motive forces which are brought to bear upon the Will. Man's Will is free in the same sense, and in the same sense only. It is subject to Law in the same sense, and in the same sense alone. That is to say, it is subject to the influence of motives, and it can only choose among those which are presented to it, or which the mind has been given the power of presenting to itself. (See note G.)

But in this last power we touch the secret of that boundless difference which separates Man from the highest of the animals

below him. There is such a gulf between the faculties of his mind and those of the lower animals, that the forces acting on the human spirit become, by comparison, innumerable, and involve motives belonging to a wholly different class and order. He is exposed, indeed, to the lower motives in common with the beasts. But there are others which operate largely upon him which never can and never do operate upon them. Foremost among these are the motives which Man has the power of bringing to bear upon himself, arising out of his power of forming Abstract Ideas, out of his possession of Beliefs, and, above all, out of his Sense of Right and Wrong. So strong are these motives that they are able constantly to overpower, and sometimes almost to destroy, the forces which are related to his lower faculties. Again, among the motives which operate upon him, Man has a selecting power. He can, as it were, stand out from among them,—look down from above them,—compare them among each other, and bring them to the test of Conscience. Nay, more, he can reason on his own character as he can on the character of another Being,—estimating his own weakness with reference to this and the other motive, as he is conscious how each may be likely to tell upon him. When he knows that any given motive will be too strong for him, if he allow himself to think of it, he can shut it out from his mind by "keeping the door of his thoughts." He can, and he often does, refuse the thing he sees, and hold by another thing which he cannot see. He may, and he often does, choose the Invisible in preference to the Visible. He may, and he often does, walk by Faith and not by Sight. It is true that in doing this he must be impelled by something which is itself only another motive, and so it is true that our Wills can never be free from motives, and in this sense can never be free from "Law." But this is only saying that we can never be free from the relations pre-established between the structure of our minds, and the system of things in which they are formed to move. From these, it is true indeed, that we never can be free. But as a matter of fact, we know that these relations do not involve compulsion. It is from compulsion that our Wills are free, and from nothing else; and for this freedom we have the only

evidence we can ever have for any ultimate truth respecting the powers of Mind—the evidence of Consciousness—that is, the evidence of observation turned in upon ourselves.

The discussions of many centuries seem to have resulted, at last, in some real progress upon this vexed question of Necessity and Free-will. That progress lies mainly in a clearer definition of terms. The most eminent living philosopher who represents the doctrine, commonly called the Doctrine of Necessity, repudiates that name as incorrect, expressly on the ground that the word Necessity, as commonly applied, signifies compulsion. Undoubtedly it does; and if this meaning be repudiated, then the word is not used in its ordinary and legitimate sense. This, indeed, Mr. Mill confesses, whilst yet he casts upon his opponents the blame of a misunderstanding, which assuredly lies with those who do not employ ordinary words in the ordinary signification. "The truth is," he says, "that the assailants of the doctrine (of Necessity) cannot do without the associations engendered by the double meaning of the word Necessity, which in this application signifies only invariability, *but, in its common employment, compulsion.*" * He believes, therefore, in Necessity only in the sense of Invariability. But if the doctrine which Mr. Mill favors has suffered from one ambiguity, it seeks to shelter itself under the protection of another ambiguity much more deceptive. If there is a double meaning in the word Necessity which has exposed the Necessitarian doctrine to unjust objections, it is equally true that there is a double meaning in the word Invariability which lends to that doctrine an undue advantage. Invariability can be predicated of mental action in this vague general sense—that all the movements of Mind must invariably arise from some motive. But this is a kind of "Invariability" which admits of any amount of variation. For, as in the language of this philosophy, Necessity does not mean compulsion, so by Invariability, as applied to the phenomena of Mind, nothing more is meant than that, in respect to mental action, there is an "abstract possibility of its being foreseen." "If," says Mr. Mill, "necessity means more than this abstract possibility of being foreseen; if it means any mysterious compulsion, apart

* "Examination of Sir W. Hamilton's Philosophy," by J. S. Mill, p. 492, note.

from simple invariability of sequence, I deny it as strenuously as any one." *

But now let us insist, as in such subjects we are bound to do, on still clearer definitions. We shall find, in the first place, that the "abstract possibility of foreseeing mental action depends on nothing less than such absolute knowledge of character and of motive as can belong to God alone. We shall then find, in the second place, that this favorite phrase, "invariability of sequence," is as ambiguous as others of the same class. It does not mean that any particular sequences are invariable, but only that there must always be *some* sequence—that it is invariably true that everything which happens has proceeded from *something* as a cause, and leads to *something* as a consequence. But this is a proposition which evidently, when reduced to its true dimensions, has no adverse bearing whatever on the doctrine of Free Will. The "abstract" possibility of foreseeing mental action depends on these two propositions: first, that where *all* the conditions of that action are constant, the resulting action will be constant also; and, secondly, that absolute and perfect knowledge of the whole of those conditions would carry with it sure foreknowledge also of the choice to which they lead. But surely this is not only true, but something very like a truism.† There is nothing to object to or deny in the doctrine, that if we knew *everything* that determines the conduct of a man, we should be able to know what that conduct will be. That is to say, *if* we knew *all* the motives which are brought by external agencies to bear upon his mind, and *if* we knew all the other motives which that mind evolves out of its own powers, and out of previously acquired materials, to bear upon itself; and *if* we knew the character and disposition of that mind so perfectly as to estimate exactly

* "Examination of Sir W. Hamilton's Philosophy," p. 517. See Note H.

† Mr. Mansel, following other philosophers on this point, reduces the modified doctrine of Necessity to this identical proposition, "that the prevailing motive prevails." Mr. Mill's reply is altogether unsatisfactory.—*Examination of Sir W. Hamilton's Philosophy*, pp. 518, 519.

I cannot help adding here—although the observation has reference to another subject—that Mr. Mill appears to me to have exposed with great force and clearness the verbal fallacies involved in Mr. Mansel's work on the "Limits of Religious Thought," and especially in the use he makes of such forms of expression as "The Absolute," "The Infinite," etc —See the chapter (vii.) on "The Philosophy of the Conditioned, as applied by Mr. Mansel to Religion," in the same work.

the weight it will allow to all the different motives operating upon it,—*then* we should be able to predict with certainty the resulting course of conduct.

This is true, not only as an abstract conception, but as a matter of experience in the little way towards perfect knowledge along which we can ever travel. We can predict conduct with almost perfect certainty when we know character with an equal measure of assurance, and when we know the influences to which that character will be exposed. In proportion as we are sure of character, in the same proportion we are sure of conduct. Yet we never think of the Will being the less free, because we can predict its course. What we know in such cases is simply the use which, under given conditions, will be made of freedom. There is no certainty in the world of Physics more absolute than some certainties in the world of Mind. We know that a humane man will not do a uselessly cruel action. We know that an honorable man will not do a base action. And if in such cases we are deceived in the result, we know that it is because we were ignorant of some weakness or of some corruption; that is to say, we were ignorant of some elements of character. But we never doubt that if those had been known, we could have foreseen the resulting lapse. Perfect knowledge must therefore be perfect foreknowledge. To know the present perfectly, is to know the future certainly. To know all that is, is to know all that will be. To know the heart of Man completely, is to know his conduct completely also; for "out of the heart are the issues of life." So far from this conclusion being dangerous or hostile to any part of the Christian system, it is a conclusion which enables us, in a dim way, not merely to hold as a Belief, but to see as a necessary truth, that there can be no chance in this world,—and how it is, and must be, that to the All-seeing and All-knowing the Future is as open as the Present and the Past. But none of these ideas involve the idea of compulsion; and the absence of compulsion is all that can be meant by Freedom.

And as by Freedom, we do not mean freedom from motives, so neither do we mean that any of the phenomena of Mind, any more than any of the phenomena of Matter, can arise without "an antecedent." In this sense there is no contradiction be-

tween the doctrine of Free Will and the amended doctrine of Necessity. Man is subject to law of Causation in this sense, "that his volitions are not self-caused, but determined by spiritual antecedents in such sort that when the antecedents are the same, the volitions will always be the same." * But this word "antecedent" is one of the many vague words in which metaphysicians delight. The highest antecedents which we can ever trace as determining conduct, are to be found in the constitution of mind itself. Love is an antecedent, so is Reverence, so is Gratitude, so is the Hunger after Knowledge, so is the Desire of Truth. So also is the action of other Spirits upon our own. Higher than these—further up the chain of Cause and Effect—we cannot go. And yet we need not conceive of these as "Final Causes," nor does the doctrine of our Free Will assign to the human Mind any self-originating power. Man has nothing which he did not receive. Such freedom as his Will possesses has been given to him, and given him, too, as we have dimly seen, by the employment and by the device of means. It is a power belonging to his structure, and derived from Him by whom that structure has been devised.

"Our Wills are ours, we know not how."

The power which in health we possess of preferring one motive to all others, whilst yet the influence of those others may be strongly felt, is a power which, like every other, must have its own "antecedent"—that is to say, its own cause, and its own purpose. But these are to be found in the Adjustment from which the power arises,—in the Mind by which that adjustment has been contrived, and in the Purposes which it reveals. The freedom of Man's Will is not more mysterious, when it is exerted in directing the Mind to one motive, and averting it from another, than when it is exerted in turning the Body to the right hand rather than to the left.†

* "Mill on Hamilton," pp. 492, 493.

† The whole of this passage on Necessity and Free Will has been severely criticised in an article in the *Dublin Review* for April 1867, as involving a practical abandonment of the very doctrine which I profess to defend. The argument there maintained seems to me altogether erroneous; and I have seen no reason to alter the text in any material point. The subject, however, is so important in itself, and so interesting as regards the history of Philosophy, that I have thought it right to deal with it in a separate note (F) already referred to.

The difficulty of reconciling, in one clear Order of Thought, the idea of the Freedom of our own Will with the idea of Causation, is not really so great a difficulty as the use of ambitious and ambiguous language has made it appear to be. There are two sentences in Mr. J. S. Mill's work, on the Philosophy of Comte, which afford the best possible illustration both of the true doctrine on the relation in which Will stands to Law, and of the false doctrine into which it may be merged by the ambiguous use of words. In one passage Mr. Mill defines the Positive as distinguished from the Theological Mode of Thought to be—"that all phenomena, without exception, are governed by invariable laws, *with which no volitions either natural or supernatural interfere.*" * It is at least satisfactory to find in this sentence so clear an avowal that the idea of free Divine Volition in the region of the Supernatural, and the idea of free Human Volition in the region of the Natural, stand on the same ground, are exposed to the same intellectual difficulties; and are both equally denied by the new Philosophy. But as a definition of the Positive mode of thought it stands in curious contrast with another passage of the same work, in which Mr. Mill says that "the Theological mode of explaining phenomena was once universal, *with the exception, doubtless, of the familiar facts which being even then seen to be controllable by human Will belonged already to the Positive Mode of Thought.*" †

These two sentences involve, on the face of them, contradictory positions. The one affirms that no volitions can interfere with the laws which govern phenomena, and that the recognition of this is the very essence of the Positive Philosophy. The other affirms that the Positive Mode of Thought is involved in the very idea of facts being controllable by human Will.

It is not, perhaps, very important to ask which of these two sentences gives the most accurate description of the Positive Philosophy; but it is of much importance to ask which of these two positions is nearest to the truth? Beyond all doubt, it is the last. If the Positive Philosophy were content with the assertion that the power of Will over facts depends on the invaria-

* "Aug. Comte and Positivism," p. 12.
† Ibid. pp. 31, 32.

bility of Laws—that is, on the constancy of Natural Forces—it would be sound enough. And so, the second of the two sentences I have quoted sets forth the central idea of that Philosophy in its most favorable light. But in the first of those two sentences we have a concentration of all that is erroneous in Positivism, and at the same time a typical example of the ambiguities and obscurities of language on which the fallacies of that Philosophy depend. There is hardly a single word in that sentence which is not ambiguously used. "Phenomena" and "facts," "govern" and "control," and "interfere with," are all used in ambiguous senses; whilst, as usual, the words "Law" and "Invariable," are used not only ambiguously, but unintelligibly. In order to test these ambiguities we have only to compare the two sentences together. "Phenomena" in the one sentence seems to correspond with "facts" in the other. Yet, we have this result,—that "phenomena" are governed by Invariable Law, whilst "facts" are controllable by human Will. It would appear, then, that the "phenomena" which are governed by Law cannot be the same with the "facts," which are controllable by Will:—or else, if they be the same, then there must be some essential distinction between "controlling" and "governing." What is this distinction? It is not defined, or even suggested. Then, again, if no volitions can "interfere with" Laws, how can volitions "control" facts? If Will controls facts, and yet can't "interfere with" Laws, how is the control over facts exercised? What is the relation between the Laws which no volitions can "interfere with," and the "facts" which volitions do actually "control?" Can Will control facts, which again are governed by laws, (in some sense or other) either by interfering with those laws, or controlling them?

If it were possible to get any definite meaning out of this confusion of words, perhaps it might be said that Will can "control" Law, but cannot "interfere with" it. There is at least a glimmering of the truth in this. But no man could gather from those two sentences of Mr. Mill what the truth is, although, after all, the truth is plain enough if only some care be taken to confine definite words to some sort of definite meaning. If by Laws are meant the elementary Forces of Nature, and if by "interfering" with them is meant any power of altering their

own essential energies—then it is true that no volitions of ours can interfere with them. But then it cannot be too often repeated that, in this sense, phenomena are NOT governed by In variable Laws; because phenomena are never the result of in dividual Forces, but are always the result of the conditions un der which several Forces are combined, and these conditions are always variable. If, again, "interference" means or in cludes the power of setting Natural Forces (Laws) to work un der new conditions, then it is the reverse of truth to affirm that they cannot be "interfered" with. Man controls facts only because (in this sense) he can, and he does, interfere with Laws. His volitions can, and do, govern those combinations of Force which are the immediate cause of all phenomena.

There is no fault in philosophical discussion more pestilent than that of using common words in some technical or artificial sense, without any warning to the reader, (often apparently without any consciousness on the part of the writer,) that ideas fundamentally involved, in the ordinary use of the word, are eliminated and set aside. We have seen one instance of this in the word "necessity," emptied of its meaning of compulsion. We have another example in the use made of such words as "changeable," and others of a like kind. Thus Mr. Mill* quotes, with approbation, a remark of Comte, that "our power of foreseeing phenomena, and our power of controlling them, are the two things which destroy the belief of their being governed by changeable Wills." All through this sentence there run the same confusions which have been pointed out in the two sentences already quoted. But there is, in addition, another confusion which has a special bearing on the subject of this chapter. Phenomena which can be controlled are phenomena which can be changed. There is no other meaning in the words. The assertion, therefore, is, that the changeability of phenomena through human agency is a fact which must destroy our belief in the changeability of the human Will itself. The sentence thus rendered is, of course, either pure nonsense, or else must be dependent for a rational sense upon some artificial meaning being attached to the word "changeable." A Will under the guidance of some settled principle—that is to say,

* "Auguste Comte and Positivism," p. 48.

following habitually some prevailing motives—might, by a certain licence of language, be called an unchangeable Will. But this has nothing to do with that kind of changeability which can alone concern the power of altering and controlling material phenomena. Stability of character, whether moral or purely intellectual, is not only compatible with a variable Will, but it is inseparably connected with it. No man can pursue one rule of conduct under changing conditions unless he himself retains his own capacities of change. He cannot control phenomena without changing them, and he cannot change phenomena without changing his own course of action; and a change in the course of action is a change in the course of Will.

That which is really at the bottom of all this ambiguity of language, is a constant endeavor to get rid altogether of an essential element in the very idea of Will,—to reduce it to something different from that which we all know and feel it to be. The word Will is indeed retained in the Positive vocabulary, but some other word is generally inserted before it, to prejudice the common understanding of it, or to impart some element of meaning which can with more plausibility be denounced. Thus the Will which is denied in Nature is often described as an "arbitrary" Will or a "capricious" Will. But surely these qualifying epithets do but add to the confusion. It is true, indeed, that the Will we see in Nature is not a capricious Will. But this is not the question. The question is, whether there is, or is not, such a thing possible as caprice in Will. If there be such a thing as caprice, then the existence of it, and the power of it "to control phenomena," cannot be denied. If there be no such thing, then "capricious" is of no meaning as an epithet applied to Will. Caprice implies not only changeableness, but, so to speak, a double degree of changeableness—a changeableness which has no rule or reason in its shiftings. It is a fact that there are human Wills of this character, and the mischief they have done in the world arises from the power they possess, in common with all other Wills, of changing phenomena after their own unreasonable nature. The truth is, that if the human Will can be described as unchangeable, then there is no such thing as changeability even conceivable in thought. There is no contrast so absolute be-

tween any two different forms of Matter, as there is between two different states of the same Mind. There is no transition in Nature from one physical condition to another so absolute or so radical as the transition to which human character is subject when it passes under the power of new convictions. There is no change like the change from hatred to affection, from vice to virtue, from evil to good. And this change in Mind is the efficient cause of a whole cycle of other changes among the phenomena which the human Will can and does alter, regulate, and control.

There is, then, not much real difficulty after all in disengaging the great facts of our own Free Will from the verbal confusions of the Positive Philosophy. Nor will the same methods of solution fail us when we apply them to the further question,—How far, and in what sense, are our own volitions themselves subject to law—that is, to the influence of Adjusted Forces? For as one great consequence of the Reign of Law over material things is the necessity of resorting to the use of appropriate means for the accomplishment of Purpose, so does the same necessity arise out of the same conditions among the phenomena of Mind. If we wish to operate upon human action, we must go to work by presenting to the Will some motive tending to produce the action we desire. Above all, if we seek to operate not merely on individual actions, but upon that which mainly determines conduct, viz. human character, we must direct our efforts to place that character under outward conditions which we know to have a favorable effect upon it. In the material world we should be powerless to control any event if we did not know it to be subject to laws—that is, to Forces which, though not liable to change in essence, are subject to endless change in combination and in use. The same impotency would affect us, if in the moral world also definite conditions had not always an invariable tendency to produce certain definite results. It is a mere confusion of thought and of language which confounds the "invariability" of "Laws," either moral or material, with the denial of the power of Will to vary, alter, and modify in infinite degrees the course of things. It is the fixedness of all Forces in one sense which constitutes their infinite pliability in another. It is the un-

changing relation which they bear to those mental faculties by which we discover them and recognize them, that renders them capable of becoming the supple instruments of those other faculties of Will, of Reason, and of Contrivance by which we can work them for altered and better purposes.

CHAPTER VII.

LAW IN POLITICS.

At first sight it may be thought that the means by which we can operate on the Wills of individual men, and of communities of men, are contained within a narrow compass, and are such as to be all, if not within easy reach, at least within easy recognition. And it is true that some methods of operating on the minds of men we do know instinctively, just as in the material world we know by the first rudiments of intelligence how to accomplish a few physical results. But experience and observation teach us, although they teach us very slowly, that direct appeals to the reason, or direct appeals to the feelings of men, are entirely useless, when those faculties have not been placed under conditions favorable to their exercise in a right direction. And as in the material world, the knowledge we have acquired of the powers of Nature, and of the methods of turning them to use, has been slowly gained in the lapse of ages, and as all we discover does but reveal how much we have yet to know; so in the immense world of the Mind and Character of Man, our knowledge of the methods by which it may be well and wisely governed, has advanced only by slow degrees. There is a boundless field of discovery still open to those who investigate the laws which govern the development of our nature. When we look at the high degrees of excellence which that nature so often attains under favorable conditions for the growth and exercise of its better powers, and when we contrast this with its stunted and distorted growth as exhibited among large portions of Mankind, it becomes a question of deep and endless interest to know how far these conditions are subject to the control of Will through the use of means. If such means can ever be devised, it must be by knowledge, first of the elementary forces which have a constant operation on Human Character, and secondly by contrivance in so combining

them as to make them operate in the direction we desire. And it is in this search that we discover the intimate blending and inseparable connection between mental and material laws—that is, between the forces which operate on the material frame and the forces which operate on the Mind and Character of Man.

And here we come on a great subject—the function of Human Law as distinguished from Natural Law. Just as the Will of the individual can operate upon itself by the use of means, some of which are known instinctively, whilst others are found out by reason; so can the collective Will of Society operate upon the conduct of its members in two ways—first, directly by authority; and secondly, indirectly by altering the conditions out of which the most powerful motives spring. This last is a principle of government, which has been distinctly recognized only in modern times, and which admits of applications not yet foreseen. The idea of founding Human Law upon the Laws of Nature, is an idea which, though sometimes instinctively acted upon, was never systematically entertained in the ancient world. Indeed, the true conception of Natural Law is one founded on the progress of physical investigation, and growing out of the habits of scientific thought. It was long before Man came to apprehend the prevalence of Law in the phenomena of Matter; and it was still longer before he could even entertain the notion of Natural Law as applicable to himself. The ancient lawgivers were always aiming at standards of Political Society, framed according to some abstract notions of their own as to how things ought to be, rather than upon any attempt to investigate the constitution of human nature as it actually is. It was a mistake in the science of Politics analogous to that which Bacon complained of so bitterly in the science of Physics. Men were always trying to evolve out of their own minds knowledge which could only be acquired by patient inquiry into facts. How worse than useless this method is, received an illustration in ancient philosophy still more striking than in ancient legislation. Fortunately for mankind, no actual legislators have ever been quite so foolish as some philosophers. Perhaps, all things considered, the most odious conceptions of Human Society which the world has ever seen, were the conceptions of an intellect certainly among the loftiest which has

ever exercised its powers in speculative thought. Plato's Republic is an Ideal State, founded on abstract conceptions of the mind, and one of its leading ideas is the destruction of Family Life, and the annihilation of the family affections. And yet this result, odious and irrational as it is, was arrived at from reasoning which is not in itself odious, but which is false, chiefly because it takes no account of the facts of Nature. The welfare of the State was to be the one object of desire in every mind. All separate interests and affections were to be suppressed, and amongst these the very idea of special property in Wife or Child. The highest type of man was to be bred by the Republic as the highest type of dogs and horses is bred by an intelligent owner.* Such are the humiliating results of abstract reasoning, pursued in ignorance of the great Law, that no purpose can be attained in Nature except by legitimate use of the means which Nature has supplied. For as in the material world, all her Forces must be acknowledged and obeyed before they can be made to serve, so in the Realm of Mind there can be no success in attaining the highest moral ends until due honor has been assigned to those motives which arise out of the universal instincts of our race.

Accordingly it is remarkable that the system of ancient philosophy, which for so many ages continued to rule the thoughts of men—the philosophy of Aristotle—owes almost all the strength it has in Politics as in other matters, to occasional and almost unconscious resort to the true methods of scientific reasoning and investigation. Aristotle founds his adverse criticism on Plato, where it is most successful, upon the actual facts of what men, under specified conditions, naturally do, and think, and feel. From these facts he argues justly as to what they would do under the artificial restrictions of a theoretical philosophy. When, for example he argues against communism, and in favor of private property, upon the ground of the watchfulness and attention which self-interest produces in the conduct of business,† and when he adds, "It is unspeakable how advantageous it is that a man ould think he has something

* "The breeding is regulated, like that of noble horses or dogs, by an intelligent proprietor."—Grote's "Plato," vol. iii. p. 203.

† *μάλλον δ' ἐπιδώσουσιν ὡς ποὸς ἰδιον ἑκάστου προσεδρείοντος.*—"Aristot. Pol." Bk. ii. c. 5.

which he may call his own, for it is by no means to no purpose that each person should have an affection for himself, *for that is natural*," * he touches the very root idea of the modern science of Political Economy. He touches it, but he does not grasp it. It is a line of argument which is never consistently maintained; and though there are perpetual appeals to "nature"—to that which is "natural"—to that which nature teaches—no definite meaning can be attached to these expressions; and dogmas are laid down as "natural" which are purely abstract and metaphysical conceptions. Nature is called as a witness, and then the witness she gives is condemned and put out of court. Industry is occasionally praised, whilst the means and the motives to industry are systematically despised. The exercise of any mechanical employment, or the following of merchandise, is condemned in an Ideal Government as "ignoble and destructive to virtue."† A maritime situation is recommended, because of its convenience in enabling a city to receive from others produce which its own country does not afford, and to export those necessaries of life of which it has more than plenty. This looks like a perception of the soundest maxims of Commerce. But in the next breath, the whole richness and blessing of Commerce, as an element of civilization, is repudiated and destroyed by the stupid and selfish maxim that a city must traffic to supply its own wants only, and not the wants of others; "for those who make themselves into an open market for every one, do it for the sake of revenue; but if a State ought to have no part in this kind of gain, neither ought it to furnish such a mart." ‡

It is surely wonderful that such a mind as that of Aristotle should have supposed that it was either possible, or, if possible, desirable that the benefits of traffic should all be on one side;

* ἔτι δὲ καὶ πρὸς ἡδονὴν ἀμίθητον ὅσον διαφέρει τὸ νομίζειν ἰδιόν τι· μὴ γὰρ οὐ μάτην τὴν πρὸς αὑτὸν αὑτὸς ἔχει φιλίαν ἕκαστος, ἀλλ' ἔστι τοῦτο φυσικόν. —Bk. ii. c. 5.

† οὔτε βάναυσον βίον οὔτ' ἀγοραῖον δεῖ ζῆν τοὺς πολίτας· ἀγεννὴς γὰρ ὁ τοιοῦτος βίος καὶ πρὸς ἀρετὴν ὑπεναντίος.—Bk. vii. c. 9. In Mr. Congreve's edition, Bk. iv. c. 9.

‡ αὐτῇ γὰρ ἐμπορικὴν, ἀλλ' οὐ τοῖς ἄλλοις δεῖ εἶναι τὴν πόλιν. οἱ δὲ παρέχοντες σφᾶς σύτοὺς πᾶσιν ἀγορὰν προσόδου χάριν ταῦτα πράττουσιν· ἣν δὲ μὴ δεῖ πόλιν τοιαύτης μετέχειν πλεονεξίας, οὐδ' ἐμπόριον δεῖ κεκτῆσθαι τοιοῦτον.—Bk. vii. c. 6.

nor is it less wonderful that, with his hands, as it were, upon the spot, and touching with his very fingers the foundation-facts, he should yet have failed to feel and to seize the great secret of modern Political Science—the links of Natural Consequence in which the blessedness of Commerce lies. But all this comes of thinking that we can be wiser than Nature, and of failing to see that every natural instinct has its own legitimate field of operation, within which we cannot do better than let it alone. It comes from the notion that we can arrive at that which ought to be, without taking any note of that which actually is.

The bondage under which all true Science lies to fact—the necessity of groping among the detail of little and common things—this is a hard lesson for the human Intellect to learn—conscious as that Intellect is of its own great powers—of its own high aims—of its own large capacities of intuitive understanding. But it is a lesson which must be learnt. There are no short cuts in Nature. Her results are always attained by Method. Her purposes are always worked out by Law. So must ours be. For our bodies and our spirits are both parts of the great Order of Nature; and our Wills can attain no end, and can accomplish no design, except through knowledge and through use of the appropriate and appointed means. Nor can those means be ascertained except by careful observation, and as careful reasoning. It is a hard thing to know all the forces which operate even on our own individual minds; and it is a much harder problem to understand the forces which arise out of the complicated conditions of human society. But the very idea of Natural Law as affecting mankind is founded on the possibility of tracing in human nature the existence and operation of forces which under given conditions do actually determine the course of human conduct in particular directions. Amongst these forces there are a certain number which are constant, or at least so constant that they may be calculated upon as certainly affecting the great majority of mankind. These are chiefly the motives which arise out of our physical constitution—the desires and affections which are common to the race. To follow these motives—to be actuated by them—is, therefore, natural. And yet to follow these motives exclusively, may, and generally does, lead to great evils, often to calamities, sometimes to destruction,

How, then, can these motives be controlled? Only by appealing to other motives—to forces lying in the higher regions of the mind, and placed there like the forces of external Nature, to be at the disposal of the Intelligence and the Will.

Are, then, these higher motives not also natural?—are they above nature?—are they supernatural? It would really seem as if this were the idea involved in the distinction which is so vaguely drawn between that which is said to be natural and that which is said to be not natural—between Natural Law and Positive Institution. Yet Reason, and Conscience, and Fancy, and Imagination, and Belief, or whatever other faculties may direct, wisely or unwisely, the course of legislation, are all equally natural to Man. They are all as much parts of his mental constitution as the desires and instincts to which the term natural is usually confined. There is no extravagance of the individual Will—there is no folly of blind and irrational legislation which has not been the fruit of some part or another of Man's nature. I dwell on this only because it is important here as in other cases, to attach a definite meaning to the words we use, and especially to a word which plays so important a part in the language both of Philosophy and of Politics.

It appears, then, that, as applied to human conduct, we mean by "natural" conduct that which men are prompted to pursue rather by instinct and impulse than by calculation of consequences and by reason. Human Laws, or Positive Institutions, as being the result of deliberation, stand contrasted with Natural Law in this sense, and in this sense alone. For as Reason and Reflection are natural to Man, and are as important parts of his nature as the highest of his instincts, so Laws founded on a right exercise of that Reason are Natural Laws in the best and highest sense of all. Laws, however, whether in this sense natural or not—that is, whether founded on a right or a wrong exercise of reason—are always intended to act as restraints on the actions of individuals, and to interfere with the motives by which their conduct would be otherwise determined. This restraint may be said to be artificial as opposed to the natural restraints of the individual reason; and this, perhaps, is the distinction most generally intended when the natural conduct of men is contrasted with their conduct under the control of Posi-

tive Institution. But as the motives which determine individual conduct are not always reasonable motives, so it is clear that what men naturally do is no sure test either of what they ought to do, or of what they ought to be allowed to do. It is their nature, under certain conditions, to do all that is bad and injurious to themselves and others. Hence it is the most difficult of all problems in the Science of Government to determine when, where, and how it is wise to interfere by the authority of Law with the motives which are usually called the natural motives of men. The question is no other than this: How far the abuse of those motives can be checked and resisted by that public authority whose duty and function it is to place itself above the influences which, in individual men, overpower the voice of reason and of conscience?

No more signal illustration has been ever given of the relation between Natural Law and Human Law—of the circumstances in which Natural Law may be trusted, and of those in which it absolutely requires to be controlled—than the illustration afforded by the history of Legislation in our own country within the present century. During that period two great discoveries have been made in the Science of Government: the one is the immense advantage of abolishing restrictions upon Trade; the other is the absolute necessity of imposing restrictions upon Labor. The rise, the growth, and the final acceptance of these two ideas as the basis of practical Legislation, is a history so curious, and having such close relation to the subject of this chapter, that I propose to deal with it somewhat in detail.

Since the dissolution of the Greek and Roman Commonwealths, no nation has acted on the one great error of all the ancient systems of political philosophy—that the natural desire of men for the accumulation of wealth is an evil to be dreaded and repressed. So far as this goes there is a sharp and striking contrast between the spirit of ancient and of modern policy. The great object of the ancient policy, says Dugald Stewart, "was to counteract the love of money and a taste for luxury by positive institutions, and to maintain in the great body of the people habits of frugality and a severity of manners. The decline of States is uniformly ascribed by philosophers and

ans, both of Greece and Rome, to the influence of riches
ional character; and the laws of Lycurgus, which, during
se of ages, banished the precious metals from Sparta, are
osed by many of them as the most perfect model of legis-
n devised by human wisdom. How opposite to this is the
rine of modern politicians! Far from considering poverty
an advantage to a State, their great aim is to open new
rces of national opulence, and to animate the activity of all
sses of the people by a taste for the comforts and accommo-
tions of life." * This is true, and has been true more or less
f all the modern nations of the world. But although they
ever held the absurd doctrine that Nature was wrong when
she taught men to desire wealth, they did hold the doctrine,
hardly less mischievous that Nature was incompetent to teach
them how best to acquire it. It would be difficult to say
whether the law of ancient Sparta, prohibiting gold from ever
coming into the State, was worse than the law of modern Spain,
which prohibited gold from ever being allowed to leave it. It
is certain that the Spanish law was at least the more irrational
of the two. If a State wishes to be poor, it is not absurd to
prohibit the making of money. But if a State wishes to be
rich, it is mere stupidity to prohibit the natural use of the me-
dium of exchange. Yet this law of Spain is only an extreme
example of the system and the theories which governed, until
the other day, the legislation of all the nations of Europe, and
which still largely prevails amongst them.

It was no oratorical exaggeration, but a strict and literal
description of the truth, when Mr. Gladstone said † of the old
commercial policy that it was "a system of robbing and plun
dering ourselves." And how was it so? What was the e
sence of its error? These questions are best answered
another. What was the central idea of the new system wh
has superseded the old one? The essential idea of these
opinions cannot be better given than in the words of Du
Stewart: "The great and leading object of Adam Sm
speculations is to illustrate the provision made by Natu

* "Account of the Life and Writings of Adam Smith," by Dugald Stewart
lected Works of Dugald Stewart," vol. x. p. 57.
† In his Speech at Glasgow, Oct., 1865.

the principles of the human mind, and in the circumstances of man's external situation, for a gradual progressive augmentation in the means of national wealth, and to demonstrate that the most effectual plan for advancing a people to greatness is to maintain that order of things which Nature has pointed out; by allowing every man, as long as he observes the rules of justice, to pursue his own interest in his own way, and to bring both his industry and his capital into the freest competition with those of his fellow-citizens." *

Adam Smith found Positive Institutions regulating and restricting natural human action in two different directions. There were laws restricting free interchange in the products of labor: and there were other laws restricting the free employment of labor itself. He denounced both. Labor was deprived of its natural freedom by laws forbidding men from working at any skilled labor, unless they had served an apprenticeship of a specified time. It was also deprived of its natural freedom by monopolies, which prevented men from working at any trade within certain localities, unless allowed to do so by those who had the exclusive privilege. The first mode of restriction prevented labor from passing freely from one employment to another, even in the same place. The second mode of restriction prevented labor passing freely from place to place, even in the same trade. Both of these restrictions were as mischievous, and as destructive of their own object, as restrictions in the free interchange of goods. They both depended on the same vicious principle of attempting to obtain by Legislation results which would be more surely attained by allowing every man to sell his goods or his labor when, where, and how he pleased. The labor of a poor man was his capital. He had a natural right to employ it as he liked. And as for protecting the community from bad or imperfect work, *that* would be best secured by unrestricted competition. The natural instincts and respective interests of producers and consumers would secure mutual adaptation. Perfect freedom of exchange in goods, the products of labor, and perfect freedom in the application of labor itself—this was the rule to follow. Natural Law was the

* Account, see p. 72.

best regulator of both. Such were the doctrines of Adam Smith, then new in the world.

It is not a little remarkable that, during the same years in which Adam Smith was working out his memorable Inquiry, other minds, working in a very different department of human thought, were preparing events which were to bring to a speedy test how far these doctrines of Natural Law were true absolutely, or true only under limitations, which he did not foresee. When Adam Smith was lecturing with applause in Glasgow from the chair of Moral Philosophy, James Watt was selling mathematical instruments in an obscure shop within the precincts of the same University. It may seem as if no two departments of human thought are more widely separated than those in which these two men were working. One was a region purely mental. The other was a region purely physical. The one had reference to the Laws of Matter. The other had reference to the Laws of Mind. Yet the work of James Watt and the work of Adam Smith were inseparably connected, not only as involving analogous methods of investigation, but as showing in their result the blending and co-operation of mental and material laws.

It was the labor of Watt to reduce to obedience, under the power of Mind, one of the most tremendous Forces of Nature, and this he did through many years of curious inquiry, and of laborious contrivance. He found only a rude and imperfect mechanism through which this great Force had been misdirected and dissipated and lost. He collected it in fitter vessels; he led it into smoother channels; he opened for it doors of passage, through which the rushing of its escape did for him what he wanted it to do. Other forces, which before had conspired against it, were so guided as to work along with it, not only in perfect harmony, but in close alliance. He made, in short, its invariable energies subject to the variable conditions of Adjustment. And so, he governed it and controlled it, and handed it over to the Human Family as the servant of their Will forever.

The work of Adam Smith was not dissimilar in its relation to the Reign of Law. It was his labor to prove that in the rude contrivances of Legislation, due account had not been

taken of the natural forces with which it had to deal. He showed that among the very elements of human character there were instincts, and desires, and faculties of contrivance, all of which by clumsy machinery had been impeded, and obstructed, and diverted from the channels in which they ought to work. He could not, however, test his reasoning as the Inventor could, by continual experiment. He had to rely on abstract reasoning, and on such verification as could be drawn from the complicated phenomena of the Body Politic. In this respect the work of Adam Smith was harder than the work of Watt. And why it was harder is a question which it may be well to ask. It is not surprising that the methods of applying to our own use the Powers of external Nature, should be matter of difficult research. But it may well seem strange that the forces which have their seat within ourselves—in the Mind and Character of Man—should be so unknown to us as to require careful reasoning and observation before we know how to use them with success for the attainment of our ends. Yet so it is. The conscious energies of the Will are ever tempted to march directly upon objects which can only be reached by circuitous methods of approach. And so the Wealth of Nations, and the skill of Crafts, and the success of Trade, had all been hindered by the measures designed for their protection. The promptings of individual interest had been checked and thwarted and driven into channels less fruitful than those which they would have naturally found.

On the other hand, the discovery of the Steam Engine, like every other weapon placed at the disposal of Mind, gave a new stimulus to the motives, and a new form to the conditions, by which the conduct of thousands was determined. Little did the brilliant Professor know that the discoveries of his humble friend would yet, in their results, serve to limit the conclusions of his own Philosophy. In the mean time, all that he knew of Watt and of his personal history seemed to be, and really was, a signal illustration of the follies of restriction. For no other reason than that he had not been born in Glasgow, Watt could not legally sell the products of his ingenuity and labor in that City. The spirit and the laws of corporate monopoly rigidly excluded him; and the company

of "Hammermen" insisted on the exclusion being maintained, for fear of "loss and skaith to the Burgesses and Craftsmen of Glasgow, by the intrusion of strangers." * The working-classes themselves were among the most strenuous supporters of a system which diminished the value by restricting the area of their labor. Fortunately the University had privileges of its own, which, within its own property, excluded the jurisdiction of a Municipality and a Craft not more ignorant or more selfish than their contemporaries at the time. It may well be supposed, that Adam Smith's opinions on freedom of labor must have been influenced by personal observation of the working of such laws in the case of a man who, though still obscure, was even then appreciated by those who knew him for ingenuity and resource.

In looking at restrictions such as these, there was nothing then to suggest to Adam Smith the consequences which might arise from the entire freedom of labor, when that labor was placed under new conditions. He had no knowledge, and he could then have no conception, what these new conditions were to be. Yet they were being silently prepared and determined in the very years in which he spoke and wrote. His friend Watt was a principal agent in the great impending change. But Watt was not alone. Other minds were working at the same time whose labors were to match with a curious fittingness into his. Indeed, the work which was going on in those years is only one example of a law of which many other examples may be found. It is an order of facts observable in the progress of Mankind, that long ages of comparative silence and inaction are broken up, and brought to an end, by shorter periods of almost preternatural activity. And that activity is generally spent in paths of investigation, which, though independent, are converging. Different minds, pursuing different lines of thought, find themselves meeting upon common ground. Such, in respect to literature, was the period of the Revival of Learning: such, in respect to Religion, was the period of the Reformation: such, in respect to the abstract sciences, was the period of Tycho Brahe, of Galileo, and of Kepler. Hardly less memorable than these, certainly not less powerful, as affecting the

* Smiles' "Life of Watt," p. 105.

condition of society, were those few years in the last quarter of the eighteenth century, which were marked by such an extraordinary burst of Mechanical Invention. Hargreaves, and Arkwright, and Watt, and Crompton, and Cartwright, were all contemporaries. They were all working at the same time, and in the same direction. Out of their inventions there arose for the first time what is now known as the Factory system; and out of the Factory system arose a condition of things as affecting human labor, which was entirely new in the history of the world. The change thus effected is a signal illustration of the relation in which Natural Law stands to Positive Institution in the realm of Mind. Let us look for a moment at its history and results.

The Common Law of England had placed no restrictions upon labor. The only restrictions which existed arose either from the special monopolies of Corporate Bodies, or from the General Statute of Apprenticeship. This statute had been passed in the reign of Elizabeth. It provided that no man should work at any craft on his own account until he had served an apprenticeship of seven years. But the Statute of Apprenticeship being in derogation of common rights, had always been construed strictly by the Courts of Law; and so it had come to pass that two great rules of limitation had been applied to it. First, it was held to apply only to such crafts of skill as were known at the time of its being passed; and secondly, it was held not to apply at all to rural districts, but only to market towns. From these two rules of limitation, it resulted, first, that all trades and employments were free which had arisen since the commencement of the seventeenth century, and, secondly, that even the older crafts were free also if they were prosecuted outside the boundaries of towns.

Such was the condition of the law when the inventions of Adam Smith's contemporaries brought into existence employments which were entirely new, and opened them to that unrestricted competition, the advantage of which he had laid down as a universal doctrine.

Spinning and weaving were not new. They were as old as the memory of Mankind. But the simple mechanism by which these arts were prosecuted were almost equally old, and had

undergone little change and little improvement. In 1760 the Spinning-Wheel, and the common Loom, as used by the people of Yorkshire, were little in advance of the implements for the same purpose which had been in use beyond the reach of History. The Spindle which is depicted on the monuments of Egypt was, until a few years ago, familiar in the Highlands. The essential feature of this ancient industry, so far as its effects upon social conditions are concerned, was that it was separate and not gregarious. It did not interfere with, but rather was congenial to, Family Life, for thousands of years,

> "Maids at the Wheel, the Weaver at his Loom,
> Sat blithe and happy." *

But the pressure of new necessities had arisen, and these could be met only by new inventions. Towards the middle of the eighteenth century, the greatest difficulty was experienced by weavers and spinners in England in maintaining their position in the markets of the world. It is curious how each new mechanical invention gave rise to the necessities out of which the next arose. The invention of the Fly Shuttle in weaving, so early as 1733, seems to have given the first impulse to all that followed. By means of this invention the power of weaving overtook the power of spinning. An adequate supply of yarn could not be procured under the ancient methods of that most ancient industry. New conditions gave rise to new motives, and new motives called into play the latent energies of Mind. The time and the cost of collecting the products of so many scattered laborers enhanced unduly the cost of manufacture, and even when the remuneration was reduced to the lowest point compatible with existence, that cost was still too high. Something was imperatively required to economize the work of human hands—some more elaborate contrivance to make that work go further than before. And so Hargreaves' invention arose, not before the time.† And when his Spinning Jenny had been invented, a still more elaborate and powerful combination of mechanical adjustments was soon perfected in the

* Wordsworth's noble sonnet—
"Nuns fret not at their convent's narrow room."

† 1765-67.

hands of Arkwright.* When the Spinning Frame was invented, and when Crompton's farther invention of the Mule Jenny speedily followed,† the new order of things had been fairly inaugurated. The great change had come, and the survivance of the ancient domestic industries of so many centuries was no longer possible.

And just as Hargreaves and Arkwright and Crompton were inventing the new machines which were to be moved, Watt was laboring at the new Power which was to move them. But meanwhile, before the Steam Engine had been made available, the Factory system had begun under the old motive-power of Water; and here it is very curious to observe how each stage in the progress of discovery had, by way of natural consequence, its own special effect on the conduct and the Wills of men. Very soon the course of every mountain stream in Lancashire and Yorkshire was marked by Factories. This again had another consequence. It was a necessity of the case that such Factories must generally be situated at a distance from pre-existing populations, and, therefore, from a full supply of labor. Consequently they had to create communities for themselves. From this necessity, again, it arose that the earlier mills were worked under a system of Apprenticeship. The due attendance of the requisite number of "hands" was secured by engagements which bound the laborer to his work for a definite period.

And now for the first time appeared some of the consequences of gregarious labor under the working of Natural Laws, and under no restrictions from Positive Institution. The mill-owners collected as Apprentices boys and girls, and youths and men, and women, of all ages. In very many cases no provision adequate, or even decent, was provided for their accommodation. The hours of labor were excessive. The ceaseless and untiring agency of machines kept no reckoning of the exhaustion of human nerves. The Factory system had not been many years in operation when its effects were seen. A whole generation were growing up under conditions of Physical degeneracy, of mental ignorance, and of moral corruption.

* 1769-71. † 1787.

The first public man to bring it under the notice of Parliament with a view to remedy, was, to his immortal honor, a master manufacturer, to whom the new industry had brought wealth, and power, and station. In 1802 the elder Sir Robert Peel was the first to introduce a bill to interfere by law with the natural effects of unrestricted competition in human labor. It is characteristic of the slow progress of new ideas in the English mind, and of its strong instinct to adopt no measure which does not stand in some clear relation to pre-existing laws, that Sir Robert Peel's bill was limited strictly to the regulation of the labor of Apprentices. Children and young persons who were not Apprentices might be subject to the same evils, but for them no remedy was asked or provided. The notion was, that as Apprentices were already under Statutory provisions, and were subjects of a legal contract, it was permissible that their hours of labor should be regulated by positive enactment. But the Parliament which was familiar with restrictions on the products of labor, and with restrictions of monopoly on labor itself —which restrictions were for the purpose of securing supposed economic benefits, would not listen to any proposal to regulate "free" labor for the purpose of avoiding even the most frightful moral evils. These evils, however great they might be, were the result of "natural laws," and were incident to the personal freedom of Employers and Employed. In the case of Apprentices, however, it was conceded that restriction might be tolerated. And so through this narrow door the first of the Factory Acts was passed. It is a history which illustrates, in the clearest light, the sense in which human conduct, both individually and collectively, is determined by Natural Law. If Watt's Steam Engine had been invented earlier—if mills had not been at first erected away from the centres of population, in order to follow the course of streams—if consequently the evils of the Factory system had not begun to be observable in the labor of Apprentices, there is no saying how much longer those evils might have been allowed to fester without even an assertion of the right to check them. The Act of 1802,* though useless in every other sense, was invaluable at least in making this assertion.

* 42 and 43 Geo. III., cap. 73.

Meanwhile Watt's great invention had been completed. And now a new cycle of events began, arising by way of natural consequence out of the Reign of Law. When the perfected Steam Engine became applicable to mills, it was no longer always cheaper to erect them in rural districts; on the contrary, it was often cheaper to have them in the towns, near a full supply of labor, and a cheap supply of fuel. With this change came the abandonment of the system of Apprenticeship. It was now "free" labor which more and more supplied the mills. But this only led to the same evils in an aggravated form. Children and women were especially valuable in the work of mills. There were parts of the machinery which might be fed by almost infant "hands." The earnings of children became an irresistible temptation to the parents. They were sent to the factory at the earliest age, and they worked during the whole hours that the machinery was kept at work. The result of this system was soon apparent. In 1815, thirteen years after he had obtained the Act of 1802, Sir Robert Peel came back to Parliament and told them that the former Act had become useless—that mills were now generally worked, not by water, but by steam—that Apprentices had been given up, but that the same exhausting and demoralizing labor, from which Parliament had intended to relieve Apprentices, was the lot of thousands and thousands of the children of the free poor. In the following year, 1816, pressing upon the House of Commons a new measure of restriction, he added, that unless the Legislature extended to these children the same protection which it had intended to afford to the Apprentice class, it had come to this—that the great mechanical inventions which were the glory of the age would be a curse rather than a blessing to the country. These were strong words from a master manufacturer; but they were not more strong than true.*

Thus began that great debate which in principle may be said to be not ended yet:—the debate, how far it is legitimate or wise in Positive Institution to interfere for moral ends with the freedom of the individual Will? Cobbett denounced the opposition to restrictive measures as a contest of "Mammon against

* "Hansard Parl. Deb." vols. xxxi. and xxxiii.—Sir Robert's Speech on Motion for a Committee, April 3, 1816.

Mercy." No doubt personal interests were strong in the forming of opinion, and some indignation was natural against those who seemed to regard the absolute neglect of a whole generation, and the total abandonment of them to the debasing effects of excessive toil, as nothing compared with the slightest check on the accumulations of the Warehouse. But the opposition was not in the main due either to selfishness or indifference. False intellectual conceptions—false views both of principle and of fact—were its real foundation. Some of the ablest men in Parliament, who were wholly unaffected by any bias of personal interest, declared that nothing would induce them to interfere with the labor which they called "free." Had not the working classes a right to employ their children as they pleased? Who were better able to judge than fathers and mothers of the capacities of their children? Why interfere for the protection of those who already had the best and most natural of all protections? Such were some of the arguments against interfering with free labor.

Now in what sense was this labor free? It was free from legal compulsion—that is to say, it was free from that kind of compulsion which arises out of the public Will of the whole community imposed by authority upon the conduct of individuals. But there was another kind of force from which this labor was not free—the force of overpowering motive operating on the Will of the laborers themselves. If one parent, more careful than others of the welfare of his children, and moved less exclusively by the desire of gain, withdrew his children at an earlier hour than others from Factory Work, his children were liable to be dismissed and not employed at all.* On the other hand, motives hardly less powerful were in constant operation on the masters. The ceaseless, and increasing, and unrestricted competition amongst themselves,—the eagerness with which human energies rush into new openings for capital, for enterprise, and for skill,—made them, as a class, insensible to the frightful evils which were arising from that competition for the means of subsistence which is the impelling motive of labor.

Nor were there wanting arguments, founded on the constancy

* This was very forcibly explained, both by Sir Robert and by his son, Mr. Peel, in the debate of Feb. 23, 1818.

of Natural Laws, against any attempt on the part of Legislative authority to interfere with the "freedom" of individual Will. The competition between the possessors of capital was a competition not confined to our own country. It was also an international competition. In Belgium especially, and in other countries, there was the same rush along the new paths of industry. If the children's hours of labor were curtailed, it would involve of necessity a curtailment also of the adult labor, which would not be available when left alone. This would be a curtailment of the working time of the whole mill; and this would involve a corresponding reduction of the produce. No similar reduction of produce would arise in Foreign mills. In competition with them the margin of profit was already small. The diminution of produce from restricted labor would destroy that margin. Capital would be driven to countries where labor was still free from such restrictions, and the result would be more fatal to the interest of the working classes of the English towns than any of the results arising from the existing hours of work. All these consequences were represented as inevitable. They must arise out of the operation of invariable laws.

Such were the arguments—urged in every variety of form, and supported by every kind of statistical detail—by which the first Factory Acts were vehemently opposed.

And, indeed, in looking back at the debates of that time, we cannot fail to see that the reasoning of those who opposed restriction on Free Labor met with no adequate reply. Not only were the supporters of restriction hampered by a desire to keep their conclusions within the scope of a very limited measure; not only were they anxious to repudiate consequences which did legitimately follow from their own premises, but they were themselves really ignorant of the fundamental principles which were at issue in the strife. Their conclusions were arrived at through instincts of the heart. The pale faces of little children, stunted and outworn, carried them to their result across every difficulty of argument, and in defiance of the alleged opposition of inevitable laws. And yet, if the supporters of the Factory Acts had only known it, all true abstract argument on the subject was their own. The conclusions to

which they pointed were as true in the light of Reason, as they felt them to be true in the light of Conscience.

The truth is, that some of the finest distinctions in Philosophy were then for the first time emerging on the stage of Politics. The newest debates of Parliament were circling unconsciously round one of the oldest disputations of the Schools. A question of practical legislation had arisen which involved one of the most difficult problems in metaphysical analysis. On the one hand, Freedom was asserted for the Will under conditions and in a sense in which it did not exist. On the other hand, Freedom was denied to the Will in a sense in which the instincts of humanity testified to its presence, and to the possibility of its being exerted with effect. The true Doctrine of Necessity was exemplified in the conduct of Employers and Employed—that conduct being determined in a wrong direction by the force of overpowering motives. The false Doctrine of Necessity was exemplified in the argument, that this conduct could not be changed under the force of higher motives asserting themselves through the Will of the Community in the form of Law.

The antagonism which was and still is so often assumed between Natural Law and Human Law, or in other words between Natural Law and Positive Institution, is an antagonism which may indeed exist, and does very often exist. But it is also an antagonism which may be eliminated, and must be eliminated, if Legislation is ever to be attended with permanent success. It is, alas, a Natural Law that men should be thoughtless and selfish, and reckless of moral consequences, when they are bent exclusively on material results. But when the consequences of this conduct have been brought home to their convictions by the force of imminent danger or of actual calamity, it is a law not less natural that they should take alarm, that they should retrace their steps, and that by walking in another course they should bring about conditions of a better kind. The Laws of Man are also Laws of Nature, when founded on a true perception of natural tendencies and a just appreciation of combined results. On the other hand, Human Laws are at variance with, or antagonistic to the Laws of Nature, when founded either on the desire of attaining a wrong end, or on the attempt to reach

a right end by mistaken means. In either of these cases Positive Institution and Natural Law become opposed, and thus a bad contrivance in Legislation, like a bad contrivance in mechanics, comes always to some dead-lock at last. Time and Natural Consequence are great Teachers in Politics as in other things. Our sins and our ignorances find us out. Both in conduct and in opinion Natural Law is ever working to convict error, to reveal and to confirm the truth.*

And so it was that the sad phenomena of Factory labor were beginning to indicate the great difference between the results of perfect freedom of exchange in the products of labor and the results of perfect freedom of competition in labor itself. Perhaps that difference ought to have been foreseen, for the cause of it is plain enough. There are certain results for the attainment of which the natural instincts of individual men not only may be trusted, but must be trusted as the best and indeed the only guide. There are other results of which as a rule those instincts will take no heed whatever, and for the attainment of which, if they are to be attained at all, the higher faculties of our nature must impose their Will in authoritative expressions of Human Law. In all that wide circle of operations which have for their immediate result the getting of wealth, there is a sagacity and a cunning in the instincts of labor and in the love of gain compared with which all legislative wisdom is ignorance and folly. But the instincts of labor, having for their conscious purpose the acquisition of wealth, are instincts which, under the stimulus and necessities of modern society, are blind to all other results whatever. They override even the love of life; they silence even the fear of death. Trades in which the laborers never reach beyond middle life—trades in which the work is uniformly fatal within a few years—trades in which those who follow them are liable to loathsome and torturing disease—all are filled by the enlistment of an unfailing series of recruits. If, therefore, there be some things desirable or needful for a Community other than the acquisition of wealth,—if mental ignorance, and physical degeneracy, be evils dangerous to social and political pros-

* "Opinionum enim commenta delet dies; naturæ judicia confirmat."—Cicero, "De Nat. Deor." lib. ii. c. 3.

perity, then these results cannot and must not be trusted to the instincts of individual men. And why? Because the few motives which bear upon them, and which consequently determine their conduct, have become almost as imperious as the motives which determine the conduct of the lower animals. Observers whose duties have called them to a close investigation of the facts have never failed to be impressed with those facts as the result of Laws against which the individual Will is unable to contend. Overpowering motives arise out of the conditions of society —out of the force of habit—out of the helplessness of poverty—out of the thoughtlessness of wealth—out of the eagerness of competition—out of the very virtues even of industrial skill. These constitute an aggregate of power tending in one direction, which make the resulting action of Mind as certain as the action of Inanimate Force. "Thus," says Mr. Baker, one of the most experienced of our Factory Inspectors, "most of the workshops of this great commercial country are found to have fallen into *the inevitable track of competitive industry*, when unrestricted by law,—namely, to cheapen prices by the employment of women and children in the first instance, and then to increase production by protracted hours of work, without much regard to age, to sex, or to physical capability." This is the result of Nature—of Nature, at least, such as ours now is. But it is the result of that Nature with all its nobler powers allowed to sleep. Power to control such evils has been given to Man, and he is bound to use it. "Free labor, even in a free country," as Mr. Baker says, "requires the strong arm of the law to protect it from the cupidity and ignorance of parents."* And by the "strong arm of the law" is meant nothing but the law of Conscience and of Reason asserting itself over the lower instincts of our nature. If under such conditions of society higher motives are ever to prevail, they must be supplied from without, and must be imposed in authoritative form through the legitimate organs of Positive Institution.†

And so the Factory Acts instead of being excused as excep-

* "Reports of the Inspectors of Factories, half-year Oct. 1864," p. 84.

† Bad as the consequences were of individual freedom under unrestricted competition in the case of labor in factories, the results were still more horrible in the case of labor in mines. In 1842 it was found absolutely necessary to prohibit altogether the labor of women and young children in mines and collieries.

tional, and pleaded for as justified only under extraordinary conditions, ought to be recognized as in truth the first Legislative recognition of a great Natural Law, quite as important as Freedom of Trade, and which like this last, was yet destined to claim for itself wider and wider application.

Accordingly, since the year when the first Sir Robert Peel pleaded the cause of Factory Apprentices, there has been going on a double movement in Legislation, one a movement of retreat, the other a movement of advance. Step by step Legislation has retired from a Province once considered peculiarly its own: step by step it has advanced into another Province within which the Schools of Political Economy would have denied it a foot of ground. Since 1802, there have been passed a long series of laws removing, one after another, all restrictions which aimed at guiding the individual Will in its sharp and sagacious pursuit of material wealth. During the same period there have been passed another long series of Acts imposing restrictions more and more stringent on the individual Will in its blind and reckless disregard of moral ends.* In neither of these movements was Parliament impelled by the light of reason, but under the blessed teaching which belongs to the Reign of Law. False theory and mistaken conduct have been found out by the working of Natural Consequence. The abstract reasonings of Adam Smith had indeed long before prepared the minds of a few to perceive the true theory of unrestricted competition in the interchange of goods. But as it needed the practical results of restriction—distress, discontent, and the danger of civil commotion—to bring home to the national understanding the economic error of the old commercial systems; so also as regards the grievous results of unre-

*It was not till 1819 that Sir Robert Peel succeeded in passing an Act restricting the labor of unapprenticed children. This Act (59 Geo. III. c. 66) is therefore, properly speaking, the first of the Factory Acts—the first which affirmed the principle of restriction as legitimately applicable to "Free" Labor. But this, as well as a subsequent Act passed in 1825, at the instance of Sir J. Hobhouse, were practically inoperative from defective enforcing clauses. It was thus apparent that the State must charge itself not only with laying down the law, but also with the duty of seeing it obeyed. It was not till this great question was taken in hand by Lord Ashley that any effectual measure was passed. His Bill became Law in 1833, as 3 and 4 Will. IV. c. 103. Nothing but a stringent system of Government Inspection was of any avail against the powerful combination of motives, out of which the evils of the Factory system arose.

stricted competition in human labor, our only effective teaching has been that of hard experience. The doctrines of Adam Smith, when applied here, were a hindrance and not a help. The Political Economists were, almost to a man, hostile to restrictive legislation. They did not see what would be the working of Natural Law upon the Human Will, when that Will was exposed to overpowering motives under debased conditions of understanding and of heart. They did not see the higher Law which Parliament was asserting when it was driven by sheer instinctive horror of actual results, to prohibit "free" laborers from disposing as they pleased of the labor of their children.

To this hour the principle on which this great counter-movement rests as regards our ideas of the legitimate province of Legislation, has never been philosophically treated. The Laws on which it depends, and which it does but recognize, have never been scientifically defined. We are still in a state of tutelage—advancing with slow and reluctant steps * in the path indicated by the teachings of Natural Consequence. The last Report on the Employment of Children shows that evils as bad as ever existed before the passing of the Factory Acts, prevail at this moment among large classes of our operative population, and demand again, as imperatively as before, an authoritative interference of Positive Institution with the freedom of the individual Will. The fact of such legislation has indeed gained a sort of silent acquiescence, and some of the old opponents have admitted that their fear of the results, in an economical point of view, has proved erroneous. But there is still no clear and well-grounded intellectual perception of the deep foundations of

* The steps here referred to are certainly becoming every year less slow and less reluctant. Since this work was published, the "Factory Acts' Extension Act" of 1867 has extended the provisions of those Acts to all establishments which employ fifty persons; and the "Workshop Regulation Act" of the same year, has carried the protection of the law into the precincts of "any room or place whatever in which any handicraft is carried on." Nay more, it extends that protection even to children who are working, not for wages at all, but only "under a parent." The principle of "State interference" is here carried to its utmost length. It is characteristic of the cautious and tentative character of English Legislation that it becomes gradually committed to great general principles, not through any perception of the truth and value of those principles in the abstract, but gradually, and through the compulsion of particular necessities. And to the last possible moment the general application of such principles is always resisted. But no argument can be used in favor of compulsory education, as regards children in "workshops," which is not equally applicable to all children whatever.

principle on which it rests. Nor is there among a large section of Politicians any adequate appreciation of the powerful influence it has had in improving the physical condition of the people, and securing their contentment with the Laws under which they live.

When, however, we think for a moment of the frightful nature of the evils which this Legislation has checked, and which to a large extent it has remedied—when we recollect the inevitable connection between suffering and political disaffection—when we consider the great moral laws which were being trodden under foot from mere thoughtlessness and greediness—we shall be convinced that if, during the last fifty years, it has been given to this country to make any progress in Political Science, that progress has been in nothing happier than in the Factory Legislation. The names of those who strove for it, and through whose faith and perseverance it was ultimately carried, are, and ever will be, in the history of Politics, immortal names. No Government and no Minister has ever done a greater—perhaps, all things considered, none has ever done so great a service. It was altogether a new era in Legislation—the adoption of a new principle—the establishment of a new idea. Nor is that principle and that idea even now thoroughly understood. The promptings of individual self-interest are still relied upon for the accomplishment of good which it does not belong to them even to suggest, and which they can never be trusted to pursue. Proposals for legislative interference with a view to arrest some of the most frightful evils of Society, are still constantly opposed, not by careful analysis of their tendency, but by general assertions of Natural Law as opposed to all legislation of the kind. "You cannot make men moral by Act of Parliament"—such is a common enunciation of Principle, which, like many others of the same kind, is in one sense a truism, and in every other sense a fallacy. It is true that neither wealth, nor health, nor knowledge, nor morality, can be given by Act of Parliament. But it is also true that the acquisition of one and of all of these can be impeded and prevented by bad laws, as well as aided and encouraged by wise and appropriate legislation.

There is no doctrine in Physics more certainly true than this doctrine in Politics—that every practice which the authority of

Society recognizes or supports has its own train of consequences which, for evil or for good, can be modified or changed in an infinite variety of degrees according as that sanction is given or withheld. Innumerable illustrations of this truth will arise, wherever we take the trouble to trace any social or political phenomena through the sequences of cause and effect from which they come. Not unfrequently these illustrations are of a melancholy kind, and give us much to think of respecting the better understanding and the better management of our complicated nature. Thus, for example, there seems good reason to believe there is a direct relation between the amount of life and property annually sacrificed by shipwreck, and the legislation which recognizes and sanctions Insurance to the full amount of the value of ship and cargo. The cause of this is obvious. Care for life is less eager and less wakeful than care for property. This is true even when men are dealing equally with their own property, and with their own lives. It is still more true when they are dealing not only with property which is their own, but with lives which belong to others. The inevitable effect of such Insurance is therefore to relax the motives of self-interest, which are the strongest incitements to precaution.* Similar results appear in a thousand other cases, both of laws still existing, and of laws which have been repealed. The conduct of men depends on the balance of motives which are brought to bear upon them. In supplying those motives, external conditions and mental character act and react upon each other. Both of these can be affected, and affected powerfully, by Positive Institution.

The restraints of Positive Institution are not, however, the only means,—very often they are not the best means by which to lighten the overpowering pressure of particular motives upon the individual Will. For as the Reason and the Conscience of the whole Political Community can interfere by the exercise of authority, so also may adequate remedies be found in the reason and the conscience of Voluntary Societies. The external conditions which tell upon the individual Will are themselves very often nothing but conditions depending on the aggregate Will

* A curious and instructive Paper upon this subject has been published by Mr. Edwin Chadwick, having been read before a recent meeting of the Social Science Association.

of those around us; and if upon them, by any means, new motives can be brought to bear, then the whole of those external conditions may be changed. The language which is used in the name of Economic Science constantly involves in this matter the same fallacy which has already been pointed out in the language used in the name of Physical Science. It is often said that the conduct and condition of men are governed by invariable laws; and the conclusion is that the evils which arise by way of natural consequence out of the action of those laws, are evils against which the struggles of the Will are hopeless. But the facts on which this conclusion is founded, are, as usual, inaccurately stated. The conditions of human life and conduct, like the conditions of all natural phenomena, are never governed by those separate and individual forces which alone are invariable, but always by combinations among those forces—which combinations are of endless variety, and of endless capability of change. Different motives arise out of the inborn gifts of character, and out of the conditions of external circumstance. It is true, indeed, that there are in the mind of Man, as there are in Nature, certain forces originally implanted, which are unchangeable in this sense, that they have an invariable tendency to determine conduct in a particular direction. But as in Nature we have a power of commanding her elementary forces by the methods of adjustment, so in the Realm of Mind we can operate on the same principle, by setting one motive to counteract another: and by combination among many motives, we can influence in a degree, and to an extent as yet unknown, the conduct and the condition of Mankind.

Nor are the resources of Contrivance limited to adjustment among the motives which arise only out of existing conditions. New motives can be evoked and put in action by the adopting of appropriate means. The mere founding, for example, of a Voluntary Society for any given purpose, evolves out of the primary elements of human character a latent force of the most powerful kind; namely, the motive—the sentiment—the feeling—the passion as it often is, of the Spirit of Association. This is a passion which defies analysis. The cynic may reduce it to a form of selfishness—and undoubtedly the identification of the interests and the desires of Self with the Society for

which this passion is conceived, lies at its very root and is of its very essence. It is true, also, that it is a passion so powerful as to need strong control—without which control it generates some of the very meanest emotions of the heart. Out of it there has come, and there comes again and again from age to age, a spirit of hatred even against good itself, when that good is the work of any one who "followeth not us." It is a force, nevertheless, rooted in the Nature of Man, implanted there as part of its constitution, and like all others of this character, given him for a purpose, and having its own legitimate field of operation. Nor is that field a narrow one. The spirit of Association is the fountain of much that is noblest in human character, and of much that is most heroic in human conduct. For all the desires and aspirations of Self are not selfish. The interests of Self, justly appreciated and rightly understood, may be, nay indeed must be, the interests also of other men—of Society—of Country—of the Church, and of the World.

And so it is that when the aim of any given Association is a high aim, directed to ends really good, and seeking the attainment of them by just methods of procedure, the spirit it evokes becomes itself a new "Law"—a special force operating powerfully for good on the mind of every individual subject to its influence. Some pre-existing motives it modifies—some it neutralizes—some it suppresses altogether—some it compels to work in new directions. But in all cases the Spirit of Association is in itself a power—a force—a Law in the Realm of Mind. What it can do, and what it cannot do, in affecting the conditions of Society, is a problem not to be solved so easily and so summarily as some dogmatists in political philosophy would have us to believe. It is a question which, like so many others, is not likely to be solved by abstract reasoning without the help of actual experiment. And this experiment is being tried. The instincts of men, truer often than the conclusions of philosophy, have rebelled against the doctrine that they are the sport of circumstances. Yet finding by hard experience that this is often true of the individual Will when standing by itself, they have resolved to try whether it is equally true of the Collective Will, guided by the spirit and strengthened under the discipline of Association. Hence the phenomena of

Combination as a means of affecting the condition of labor—phenomena so alarming to many minds, and certainly so well deserving of attention. Let us look for a moment at the important illustrations of the Reign of Law which these phenomena afford.

A moment's consideration will convince us that the same necessities of labor which were found to determine so fatally the condition of women and children, are necessities which apply without any abatement to the labor of adult men. They must be subject to the same pressure of inducements. Nay, more, it is only through them that this pressure can reach the women who are their wives, and the children who are their children. If overpowering motives did not equally determine the conduct and condition of adult men, no legislation would have been required for the protection of their families. If a man is placed under such conditions that he cannot save his wife and child from exhausting labor, it is certain that the same conditions will impose a like necessity upon himself. Nevertheless, Parliament has resolutely and wisely refused to interfere on his behalf. And why? Because the argument is that the adult man is able, or ought to be able, to defend himself. And so he can; but how? Only by combination. The "law" which results in excessive labor is the law of competition—that is, it is the attraction exerted upon the Wills of a multitude of individual men by the rewards of labor. The pressure of this attraction can only be lightened by bringing those Wills under the power of counter motives, which may induce them to postpone, to some higher interest, the immediate appetites of gain. And this is the work which Combination does. It comes in the place of Positive Institution. Those who are under it "are a Law unto themselves."

Nor is it unimportant to observe that what Combination does for the protection of labor, it does better, and with better consequences, than Positive Institution can ever do. Men are driven to excessive labor, because if they don't work excessively, others will. But it is the effect of Combination that others won't. Under Positive Institution they are not allowed. Under Combination they are determined not. And as the forming of an intelligent resolution, and the abiding by it, are

higher exercises of mind than the mere passive obedience to authority, so is the good effected by Combination a higher good than that resulting from Factory Legislation. It tends to form and to strengthen character. It tends to subordinate the present to the future, and the temporary interests of Self to the permanent welfare of a Brotherhood of men. And this it tends to do in classes otherwise prone to follow only the impulse of the moment, and to consider only the apparent interests of the individual.

These considerations should disabuse our minds of the unjust and unreasonable prejudice against the principle of Combination which still betrays itself so strongly in the language of many politicians. When the Working Classes combine for the protection of their own labor against the effects of unrestricted competition, they are simply taking that course which is recommended alike by reason and by experience. It is the course which Parliament has indicated as the right course both by what it has itself done, and by what it has declined to do. Nor can there be any greater mistake than to suppose that this course involves necessarily any rebellion against the laws of economic science. Combination is an appeal to the most fundamental of all Natural Laws—to the law of Contrivance—to the power of Adjustment—wielding, through Reason and Conscience, the elementary forces of Human Character. Of the constancy and "invariability" of these no doubt or denial is involved. Rather the reverse. It is upon instinctive trust in that constancy that all social and political Contrivance rests. And so we need not be surprised to find that, through the organized efforts of communities of men, the evils which arise by way of natural consequence out of the helplessness and thoughtlessness of the individual Will, are evils which to a large extent can be met and overcome.

But though all this is true, universally, of the principle of Combination, it is vary far from being true, universally, of the particular purposes to which Combination is applied. All the sources of error which have so long perverted Legislation, are equally powerful in perverting the aims, and in misdirecting the efforts of Voluntary Association. If the upper classes, with all the advantages of leisure, and of culture, and of learning,

have been so unable, as we have seen them to be, to measure the effect of the laws they made, how much more must we expect errors and misconceptions of the most grievous kind to beset the action of those who—through poverty and ignorance, and often through much suffering—have been able to do little more than strike blindly against evils whose pressure they could feel, but whose root and remedy they could neither see nor understand?

Accordingly, the history of Combination among the Working Classes has, until a very recent period, been a sad history of misdirected effort—of strength put forth only in violence and disorder, and of the virtues of Brotherhood lost in tyrannical suppression of all individual freedom. Its heaviest blows have been often aimed at the most powerful agencies for good. One of the very earliest forms of Combination has been that which was directed against the introduction and improvements of machinery. The Working Classes have always encountered with jealousy and fear those triumphs of Mechanical Invention whose function it is to economize labor and to multiply the fruits of industry, It would be hard to blame them. What class is there which can say with truth that they have themselves been able always to follow with intelligent foresight the links of Natural Consequence through the darkness into which they so often lead? For almost every great step in the advance of civilization plunges at first through some passage which seems dangerous, or at least obscure. The happiest achievements of Contrivance have their own aspects of apparent danger, and their own real incidents of temporary evil. Every new machine displaces and disorganizes pre-existing forms of labor; and we have seen that, even in its ultimate effects, the advance of Mechanical Invention developed new dangers to the Working Classes—dangers only to be avoided by measures which were not taken, and by precautions which were not adopted.

It would be well if, from the past convicted errors, both of Legislation and of Combination, we could extract some conclusions of general principle capable of helping us in the difficulties of our own time. In looking at the root of those errors, it would seem that, in order to avoid them, two things are necessary—first, unshaken faith in great Natural Laws;

and, secondly, a faith not less assured in the free agency of Man to secure by appropriate means the working of those laws for good. Thus, the love of gain is an instinct implanted in the human mind, and the endeavor to suppress it has always been the violation of a Natural Law. In like manner, Mechanical Invention is a Law of Nature in the highest and strictest sense. The power of it and the love of it are among the elementary forces of human character. Each fresh exertion of it is, and must be, according to the constitution and course of Nature—leading to higher and higher fulfilments of the original Purpose of Man's Creation, which was, that he should not only inhabit the Earth, as the beasts inhabit it, but that he should subdue it.

So also combination is natural to Man. The desire for it and the need of it, grow with the growth of knowledge and with the increasing complications of Society. It has now, for the most part, emerged from the stage of rude ignorance which led to the breaking of machinery. It is conducted, comparatively at least, with high intelligence, and aims for the most part at legitimate objects of desire. Yet in the rebellion which has been roused against the doctrines of Necessity, founded on false conceptions of Invariable Law, there is a constant danger lest the Spirit of Association should attempt to act against Nature instead of acting with it. There is, for example, a Law —an observed order of facts—in respect to Man, which the working Classes too often forget, but which can neither be violated nor neglected with impunity. That Law is the Law of inequality—the various degrees in which the gifts both of Body and of Mind are shared among men. This is one of the most fundamental facts of human nature. Nor is it difficult to see how it should be also one of the most beneficent. But it is a fact against which the spirit of combination is very apt to assume an attitude of permanent insurrection. It is, of course, the business and the function of Combination to subordinate in some things the Individual to the Class; and the temptation is to make that subordination exclusive and complete. Hence the jealousy so often shown of wages measured by the amount of work performed. This is a jealousy of the superiority of reward which is naturally due to superiority of power, of indus-

try, or of skill. But these are things which God has joined together, and which no man or combination of men have a right to put asunder. It is a marriage made in the morning of the world, and in every step of human progress we see its blessing and its fruit. If it be stupid to break machines and to proscribe Mechanical Invention, it is not less stupid to be jealous of this primeval adjustment between the varying energies of human character and the varying results which they are competent to attain.

This is not the place to enter in detail on the difficult and complicated question as to the limits within which Combinations can, and beyond which they cannot, affect the rewards of labor. They have certainly succeeded in limiting the hours of labor in cases where Legislation could not well have interfered;* and wherever the hours of labor are reduced without a corresponding reduction in wages, a substantial economic advantage is unquestionably secured. Equal confidence is expressed by many Associations, that as a matter of experience and of fact, they have succeeded in establishing higher rates of wages than would have accrued under the system of unrestricted competition. This may very well be true. It is a truth which casts no doubt whatever on the invariability of Economic Laws when these are rightly understood. They are invariable in the same sense, and in no other, in which all other Natural Laws are invariable. That is to say, they represent tendencies in human character determined by motives, which tendencies are constant, and may surely be relied on as producing always, under like conditions, their own appropriate effects. It is upon this constancy that Combination must rely for any power it can ever have; and it is the same constancy in the action of specific motives which sets bounds to the power of Combination, beyond which it can never pass. The same motive which impels the Workman to secure an adequate reward for his

*Of this the Baking Trade is a good example. The hours of adult labor in this trade, under the effects of unrestricted competition, had come to be most injurious and oppressive. In Glasgow and in Edinburgh this condition of things has been effectually remedied by a Combination, whose exertions were successful, without (I believe) resort being ever had to the extreme measure of a Strike. The Baking Trade in London is still afflicted by the same oppressive hours of labor, because of the difficulty which has hitherto been experienced in organizing there any Combination equally complete.

labor, impels the Manufacturer or the Trader to secure an adequate reward for his capital, his knowledge, and his skill. And although the desire of gain is not the only motive, and is often not the strongest motive, which impels men to persevere in enterprises once begun, yet if Combinations of Workmen should attempt to raise wages so high as to trench upon the minimum rate of profit which will induce men to carry on any given trade, then by a natural consequence, not less certain than any other, capital and enterprise and skill will be withdrawn from that trade, and those who depend upon it will be the first to suffer. Short, however, of this extreme result, there is generally a margin of ground upon which Combination may act with more or less effect. It may prevent arbitrary or capricious changes; and as there are practically many impediments in the way of men moving their capital from one employment to another, Combination may compel them to submit to lower rates of profit than would otherwise content them if those difficulties did not exist.

But to all these possibilities of influence there is a limit in the nature of things—in Natural Laws—that is, in the new motives which are brought into operation by new conditions. What that limit is, it must always be difficult to determine except by actual experiment. It is enough here to observe that in this, as in every other department of human conduct, men are being led gradually to a knowledge of the truth by the teachings of Natural Consequence. It is by the experience of actual results that we are taught both as to the objects which are legitimate objects of desire, and as to the proper methods by which these may be attained. The very attempt of the Working Classes to govern through Combination their own affairs, and to determine their own condition, is an Education in itself. On the extended scale in which that attempt is being made, it must accustom them to consider great general causes, and to estimate the manner and the degree in which these can be effected by the methods of Adjustment. Last, not least, it must lead them to study and to recognize the moral duties which are indeed the most fundamental of all Natural Laws. For it ought to be remembered, that the first and most important object of Combinations is one against which there can be no opposition founded on the doc-

trines of Economic Science. That object is to secure for the Working Classes those provisions against misfortune, sickness, accident, and age, which are amongst the first duties of all organized societies of men. How far through such agency the causes of pauperism may be successfully attacked, is a question on which we are only entering. In like manner, the conditions and limitations under which Combination may succeed in blending the functions and in uniting the profits of Capital and of Labor—this also is a question to be determined by Natural Laws, not yet fully explored or understood. But enough is known, and results sufficiently determinate have already been secured, to convince us that in this great department of Natural Law, as in every other, the Will of Man is not powerless when its energies are directed by wisdom, and when the choice of its methods is founded upon knowledge.

This is, indeed, the great lesson to be learnt from every inquiry into the constitution and course of things. Nature is a great Armory of weapons, and implements, for the service and the use of Will. Many of them are too ponderous for Man to wield. He can only look with awe on the tremendous Forces which are everywhere seen yoked under the conditions of Adjustment—on the smoothness of their motions,—on the magnitude and the minuteness, on the silence and the perfection, of their work. But there are also many weapons hung upon the walls which lend themselves to human hands—lesser tools which Man can use. He cannot alter or modify them in shape or pattern—in quality, or in power. The fashion of them and the nature of them are fixed forever. These are, indeed, invariable. Only if we know how to use them, then that use is ours. Then also the lesser contrivances which we can set in motion are ever found to work in perfect harmony with the vaster mechanisms which are moving overhead. And as in the material world no effort gives so fully the sense of work achieved as the subjugation of some Natural Force under the command of Will, so in the world of Mind no triumphs of the Spirit are happier than those by which some natural tendency of Human Character is led to the accomplishment of a purpose which is wise and good. It is for the gaining of these triumphs that Man has been gifted with the desire of Knowledge, and with the sense of Right,

and with the faculties of Contrivance. In such triumphs lie the aim and purpose of all Natural Laws—for these they were all established—for these they all work, whether by way of encouragement, or of restraint, or of retribution.

Nothing is more striking in the history of Discovery than the ages during which men have been blind to the suggestions of Natural Law—suggestions which now appear so obvious that we wonder how the interpretation of them could have been missed so long. It is very easy to feel this wonder concerning others; it is much more difficult to remember that the same wonder will certainly be felt concerning ourselves. Such as we now see to have been the position of former generations in respect to things which they failed to understand,—such, we may depend upon it, is precisely our own position in regard to innumerable phenomena now constantly passing before our eyes. We may be sure of this; and we ought to be as glad of it as we are sure. For the world is not so prosperous or so happy as that we should readily or willingly believe in the exhaustion of the means which are at our disposal for its better guidance. Especially in the great Science of Politics, which investigates the complicated forces whose action and reaction determine the condition of Organized Societies of men, we are still standing, as it were, only at the break of day. Our command over the external elements of Nature is, beyond all comparison, in advance of our command over the resources of Human Character.

Special causes retard the progress of knowledge in this department of inquiry. Many problems so difficult and intricate that they never can be solved except by patient observation, patient thought, and yet more patient action, are as yet hardly recognized to be problems at all. We look on the facts of Nature and of human life through the dulled eyes of Custom and Traditional Opinion. And when some misery worse than others forces itself upon the acknowledgment of the world, men are slow to discover or admit their own power over the sources whence such miseries come to be. That which is needed to open our eyes to such questions, is not mere intellectual power. Rarer and finer qualities have this work to do. Among the characteristics of the individual men who have exerted the most powerful influence for good on the condition of Society, no

quality has been more remarkable than a certain natural openness and simplicity of mind. Readiness to entertain, willingness to accept, and enthusiasm to pursue, a new idea, have always been among the most fruitful gifts of genius.

Is it vain to hope that the thoughtfulness and candor which have been the natural inheritance of a few, may yet be more common among all educated men? The whole constitution and course of things would receive an earlier fulfilment did we carry about with us an habitual belief in the inexhaustible treasures which it holds—in the power of the agencies which it offers to Knowledge and Contrivance. For then the results of Natural Consequence would be accepted for that which they teach, and not simply submitted to for that which they inflict. The disorders of Society would not so often be supinely regarded as the result of inevitable laws, but would be seen as the fruit always of some ignorance or of some rebellion; and so the exhilarating conviction would be ours, that those disorders are within the reach of remedy through larger Knowledge and a better Will.

We hear much now of the "blessed light of Science," * and if the methods and conditions of Physical inquiry were applied in a really philosophical spirit to Spiritual Phenomena, the influence of Science for good would be more powerful than it is. Meanwhile it is well to remember that although readiness to accept a new idea is essential to Discovery, it is equally true that new dangers beset and surround all new aspects of the truth. Paradoxical as it may sound to say so, this is a consequence of the splendor of Man's endowments, of his freedom from direction,—of the swiftness and the subtlety of his mental powers. On her own narrow path Instinct is a surer guide than Reason, and accordingly it is often the higher faculties of the mind which are the most misleading. The Speculative Faculty is impatient of waiting upon Knowledge, and is ever as busy and as ingenious in finding out new paths of error as in supplying new interpretations of the truth. Hence in Philosophy the most extravagant errors have been constantly associated with the happiest intuitions, and it has remained for the successors of great men in another generation to separate their discoveries from their delusions. Hence also in Politics the great move-

* See a remarkable passage in the concluding pages of "Ecce Homo."

ments of Society have seldom been accomplished without raising many false interpretations of the Past, and many extravagant anticipations of the Future.* It cannot, indeed, be said with truth that the calamities of Nations have generally arisen from too great play being given to novel or theoretical conclusions. Rather the reverse. They have arisen, for the most part, from too little attention being paid to the progress of opinion, and to the insensible development of new conditions.

The question has been often raised, whether there is any law of growth, of progress, and of decay prevailing over Nations, as over individual Organisms. Whatever the solution of this question may be, it is certain that some causes are no longer in existence which produced—not indeed the corruption, but—the final overthrow of the great historical Nations of Antiquity. The epoch of conquering Races destroying the Governments, and reconstructing the Populations of the World, is an epoch which has passed away. Whatever causes there may be now of political decline are causes never brought to such rough detection, and never ending in catastrophes so complete. Yet, in modern days a condition of stagnation and decline has been the actual condition of many Political Societies for long periods of time. It is a condition prepared always by ignorance or neglect of some moral or economic laws, and determined by long-continued perseverance in a corresponding course of conduct. Then the laws which have been neglected assert themselves, and the retributions they inflict are indeed tremendous. In the last generation, and in our own time, the Old and the New Worlds have each afforded memorable examples of the Reign of Law over the course of Political events. Institutions maintained against the natural progress of Society have "foundered amidst fanatic storms." Other institutions upheld and cherished against justice, and humanity, and conscience, have yielded only to the scourge of War.

It is in the wake of such convulsions that reactions of opinion so often sweep over the Human Mind, as hurricanes sweep over the surface of the Sea. But whatever new forms of error are begotten of reaction, it is a comfort to believe that there

* "Nos pères en 1789 ont été condamnés à passer des perspectives du Paradis aux scènes de l'Enfer."—Guizot, "L'Eglise et la Société," p. 218.

are always some steps gained which are never lost. No man can look back on the history of modern civilization without seeing that it presents the phenomena of development and growth. Nor can it be doubted, surely, that whatever may be the decline of particular Communities, the progress of mankind, on the whole, is a progress to higher and better things. And if this be true, no particular exceptions should shake our faith in the general rule that all safe progress depends on timely recognition being given to the natural developments of Thought. They can never be resisted in the end, and they are most liable to take erroneous directions when they are resisted long. For this is among the most certain of all the laws of Man's nature —that his conduct will in the main be guided by his moral and intellectual convictions. "All human society is grounded on a system of fundamental opinions." Such is the Law arrived at by the newest of modern Philosophies,* and it would be well if all its discoveries were as near the truth. This is the Law to which Christianity appeals, and in which its very roots are laid, when it asserts, as no other Religion has ever asserted, the power and virtue of Belief. And in this Law lies the error which those commit who imagine they can hold by the Ethics of Christianity, whilst regarding with comparative indifference its History and its Creed. This, too, is the Law which lends all their importance to the speculations of Philosophy. False conceptions of the truth, in apparently the most distant provinces of Thought, may and do relax the most powerful springs of action. Among these false conceptions of the truth, none are now more prevalent than those which concern the definition, and the function and the power of "Law." Instead of regarding the Constancy of Nature as incompatible with the energies of Will, we must learn to see in it the most powerful stimulus to inquiry, and the most cheering encouragement to exertion.

The superstition which saw in all natural phenomena the action of capricious Deities was not more irrational than the superstition which sees in them nothing but the action of Invariable Law. Men have been right and not wrong, when they saw in the facts of Nature the Variability of Adjustment even more

* "The Positive Philosophy of Aug. Comte," by J. S. Mill, p. 101.

clearly and more surely than they saw the Constancy of Force. They were right when they identified these phenomena with the phenomena of Mind. They were right when they regarded their own faculty of Contrivance as the nearest and truest analogy by which the Constitution of the Universe can be conceived and its order understood. They were right when they regarded its arrangements as susceptible of Change, and when they looked upon a change of Will as the efficient cause of other changes without number and without end. It was well to feel this by the force of Instinct; it is better still to be sure of it in the light of Reason. It is an immense satisfaction to know that the result of Logical Analysis does but confirm the testimony of Consciousness, and run parallel with the primeval Traditions of Belief. It is an unspeakable comfort that when we come to close quarters with this vision of Invariable Law seated on the Throne of Nature, we find it a phantom and a dream—a mere nightmare of ill-digested Thought, and of "God's great gift of speech abused." We are, after all, what we thought ourselves to be. Our freedom is a reality, and not a name. Our faculties have in truth the relations which they seem to have to the Economy of Nature. Their action is a real and substantial action on the Constitution and Course of things. The Laws of Nature were not appointed by the great Lawgiver to baffle His creatures in the sphere of Conduct, still less to confound them in the region of Belief. As parts of an Order of things too vast to be more than partly understood, they present, indeed, some difficulties which perplex the intellect, and a few also, it cannot be denied, which wring the heart. But, on the whole, they stand in harmonious relations with the Human Spirit. They come visibly from One pervading Mind, and express the authority of one enduring Kingdom. As regards the moral ends they serve, this, too, can be clearly seen, that the purpose of all Natural Laws is best fulfilled when they are made, as they can be made, the instruments of intelligent Will, and the servants of enlightened Conscience.

NOTES.

NOTE A.—PAGE 28.

THE article by Mr. Wallace in the *Journal of Science* (No. XVI.) for Oct. 1867, on "Creation by Law," implies much misconception of the whole drift and aim of the observations I have made on Mr. Darwin's "Theory of the Origin of Species."

Two separate questions arise in respect to that Theory:—

1st. Does it adequately explain the Physical Agencies by which new Forms have come to be?

2d. Does it, even if successful in this explanation, supplant or impair the argument for Purpose and Design, as founded both on the results and on the methods of Creation?

Of these questions, which are entirely distinct, the last is by far the most important of the two: and this second question is the one which I have chiefly dealt with in the "Reign of Law." As regards the first question, indeed, I have indicated my opinion that the explanation of Physical Agencies is very far from being complete, and that the hypothesis can always be driven back to some starting point where the very condition of things is assumed for which the theory professes to account. In this edition, and in answer to Mr. Wallace's challenge, I have added some farther indication of the difficulties which remain unsolved, and indeed untouched.

But my main argument has been addressed to the second question, and has been aimed chiefly at this conclusion—that even supposing the theory to be established, so far as it can go, it cannot affect or disturb the inseparable relation which exists between the intricate adjustments of Nature and Mental Purpose—as their sole conceivable origin and cause. In respect to this argument, Mr. Wallace virtually admits all I have maintained, when he says, "It is simply a question of how the Creator has worked."* I have said nothing of "incessant interference," of "continual re-arrangement of details," or of "the *direct* action of the Mind and Will of the Creator." On the contrary, I have said that no purpose is ever attained in Nature except by the enlistment of Laws as the means and instruments of attainment; † that although Law "is never present as a master, it appears never to have been absent as a servant," ‡ that we have "no certain reason to believe that God ever works otherwise than through the use of means;"

* *Journal of Science*, p. 473. † P. 100. ‡ P. 208.

or, in other words, through the instrumentality of those elementary forces or properties of matter and of mind which we call "Laws." The idea of "incessant interference," is one which I hold to be essentially erroneous. It involves the idea of natural forces being agencies altogether external to, and independent of, the Creative Mind. This is the very idea to which Mr. Wallace himself gives expression in its extremest form, when he limits the function of the Creator to that of so co-ordinating general laws "*at the first introduction* of life upon the earth," * as that they shall work "of necessity" and "by themselves" the results we see. This is unquestionably the way in which they appear to us to work. It remains true that "no man hath seen God at any time." But even this conception does not make the word "contrivance" (to which Mr. Wallace objects) less applicable to the adjustments of nature. On the contrary, it makes it more strictly and literally applicable than any other conception, because it likens the creative process more closely to those methods adopted by human ingenuity, to which the word contrivance specially refers. The highest efforts of that ingenuity are precisely those in which natural forces are made to work "necessarily" and "by themselves." Self-acting machines are the most ingenious machines of all. The self-action of the "governor" in a Steam-engine is the most beautiful of the contrivances by which the elementary expansive force of steam is made to do the work of Will. Mr. Wallace thinks it "an extraordinary idea to imagine the Creator of the Universe *contriving* the various complicated parts of an Orchis, as a mechanic might contrive an ingenious toy or puzzle." † But this is precisely the idea he himself supports, when he reduces the Creator's work to the first starting of the forces of organic life, and to the *foresight* merely of the consequences which must naturally and necessarily arise from their first co-ordination. This is an accurate description of the method in which a mechanic contrives the most ingenious self-operating machines. No doubt the idea of Omnipresence, which is the distinctive idea of God's work as distinguished from Man's work, is an idea which it is difficult for us to grasp or to keep steadily in view. I do not deny or dispute that "self-action" is and must be the aspect in which Nature presents herself to us. It could not be otherwise, unless the Invisible were to become the object of sight and touch. But in proportion as we appreciate the infinite intricacy of Natural Adjustments, in the same proportion do we estimate the impossibility of conceiving them as the result of Mechanical Necessity, which indeed is an inadequate explanation even of our own methods of operation upon the material world.

Mr. Wallace's article is an excellent example of the arguments used in support of the Darwinian theory, both in their strength and in their weakness. Their strength lies in the hold they have of the idea and of the fact that nature is one vast system of Invisible Forces in a condition of mutual adjustment. Their weakness lies in the idea that the methods of that adjustment can ever be explained as the result of mechanical necessity, or of the mere elementary properties of matter working "by themselves."

* *Journal of Science*, p. 474. † Ibid.

NOTE B.—PAGE 51.

Although the distinction I have made between Purpose as a general inference, and Purpose as a particular fact, is a distinction which seems to me to be clear enough when it is pointed out; yet it may be well to give some further illustrations here which could not be conveniently added to the text. What Positivists profess to insist upon is, that in describing a scientific fact, we shall not import into it ideas which it does not necessarily involve, and which are in the nature of inferences from the fact. What we, their opponents, have an equal right to insist on is this—that in describing scientific facts, the description must not *exclude* any of the ideas which the facts do involve, and that the full and adequate description of those facts be not evaded in order to keep out an idea which the describer may choose to call an inference. Let us take an illustration. Let us suppose that we find a tube placed anyhow in such a position that we can look through it to the sky at night. We do so, and we see a star. The facts may be such that this description fully exhausts them. That the tube was intended to bear upon that particular star, or upon any star, would be a mere inference. But now let us suppose that, when we look again after some considerable interval of time, we find that the tube still bears upon the same star, and let us further suppose the same experiment repeated with the same result during some hours, then we should not describe the fact fully by simply stating that the tube bore upon the star. It would be necessary, in order to exhaust the facts, to say that the tube was *so adjusted as to follow* the apparent motion of the sidereal heavens, and so to counteract the natural effects of the earth's motion as to keep its axis always upon the same star. Here instantly we have the language of intention, because the idea of intention is inseparable from the facts. We might know nothing of the method by which this adjustment is achieved—nothing more of the Mind that had devised the method than the bare fact of the intention. But that bare fact is an essential part of the observed phenomena. And the same argument applies to the mechanism—if that also were discovered—by which the adjustment is effected between the axis of the tube and the apparent motion of the star. That mechanism could not be fully described unless it were described as a mechanism *so contrived as to bring about* the adjustment which is actually effected.

Take again another case, from the organic world. A calf, or any other young animal, discovers by smell or by accident, the fact that milk is contained inside a skin or bag, and that, by applying its mouth or its tongue to some opening, it can get at the milk. The whole fact in this case is exhausted when we say that the calf gets the milk. It is no part of this fact that the calf was intended to get it. But when a calf goes for milk to its mother's udder—when the lacteal glands of the cow are recognized as an apparatus for secreting that milk, and the teat for delivering it,—then the facts are not exhausted, the scientific description is not complete or truthful, unless we use language importing this adjustment of apparatus to Purpose in the plan by which nourishment is afforded to the young in

all mammalia. This idea cannot be expelled from science as a mere "inference," except on the same arguments of bad metaphysics, as I hold them to be, by which also the existence of Matter and of an External World are referred to the same category.

NOTE C.—PAGE 52.

In illustration of the assertion in the text, that the relations of Number, which are the very basis of all "verifiable" knowledge, may be reduced by similar arguments to mere creations of the Mind, I may here remind the reader of the passage which relates to this subject in the famous argument of Berkeley:—

"That number is entirely the creature of the mind, even though the other qualities be allowed to exist without, will be evident to whoever considers that the same thing bears a different denomination of number as the mind views it with different respects. Thus the same extension is one, or three, or thirty-six, according as the mind considers it with reference to a yard, a foot, or an inch. Number is so visibly relative and dependent on men's understanding, that it is strange to think how any one should give it an absolute existence without the mind. We say one book, one page, one line; all these are equally units, though some contain several of the others. And in each instance it is plain the unit relates to some particular combination of ideas arbitrarily put together by the mind."—*Prin. of Hum. Knowl.*, Part I. § xii.

NOTE D.—PAGE 122.

Mr. Mill, in his "System of Logic" (Book I. c. iii., §§ 6, 7, 8) has told us that both of Bodies and of Minds, "philosophers have at length provided us with a definition which seems unexceptionable." As regards body, this definition is—"The external cause, and (according to the more reasonable opinion) the unknown external cause, to which we refer our sensations." This definition, though very defective, is at least not erroneous. It is necessary, however, to observe that the word "unknown" cannot be accurately predicated of that respecting which the very terms of the definition imply that something is known. The definition of Body is the definition of that which is known respecting it. Three things are involved in this definition, as known respecting Body;—these are (1) Externality, (2) Extension, and (3) Causation—that is to say, the power of causing or exciting sensations in sentient beings. Or perhaps these three items of knowledge may be merged in one—the knowledge of Force acting from outside upon us, and exciting sensations in us. But this is knowledge. When the word "unknown" therefore is inserted in the terms of the definition given by Mr. Mill, it can only mean that other things still remain to be known respecting the nature and properties of Body. In this sense—that is, when translated into "partially known"—no philosopher would deny the correctness of its application. The definition of both Body and Mind is given by Mr. Mill in another

passage, which, also, so far as it goes, is unexceptionable. "As Body is understood to be the mysterious something which excites the mind to feel, so Mind is the mysterious something which feels and thinks." The same two fundamental ideas of Externality and Causation are here also implicitly and inextricably involved. Mr. Mill adds that the farther discussion of this question belongs not to Logic but to Metaphysics, to which science he leaves it.

Two chapters, accordingly, in Mr. Mill's "Examination of Hamilton" (xi. and xii.), are devoted to a discussion of the "Psychological Theory of the Belief in an External World," and of the question how far the same theory may or may not be also applicable to Mind. The conclusion to which I have referred in the text is the conclusion defended in the first of these chapters. It is the conclusion of a Pure Idealism—an Idealism much more extreme than the theory of Berkeley. It is true that Berkeley denied the existence of Matter as a thing apart from Mind—not, be it observed, as a thing apart from *our minds*, but as a thing apart from *some mind*. But this was only because he sublimed it into the action of another Spirit upon our own. In his system the idea of Causation was tenaciously retained. The very essence of his argument was that our ideas must have a cause—"some cause whereon they depend, and which produces them and changes them." As this cause could not be the ideas themselves (which ideas are all that we know of matter), "it remained that the cause of Ideas is an incorporeal active substance or spirit." * This argument is repeated in several forms, as again where he says,† that men were "conscious that they were not the authors of their own sensations, which they evidently knew were imprinted *from without*, and which therefore must have some cause distinct from the Minds on which they were imprinted." But the Psychological Theory of Mr. Mill involves all the weak points of the Berkeleian theory with none of its strength. Mr. Mill's formula is expressly framed so as to eliminate as much as possible the idea of Causation, and to keep out of sight the connection which exists between our sensations and that which excites them. The attempt, indeed, is not successful, because Mr. Mill cannot express himself through many consecutive sentences without assuming the very ideas which he is trying to account for as a mere product of more elementary conceptions. This has been shown clearly, and with abundant illustration, in Dr. M'Cosh's "Examination of Mr. J. S. Mill's Philosophy." Mr. Mill pleads upon this point that he must use common language, but that the whole of this language has its own special meaning under the Psychological Theory as well as under the common Realistic Theory. This may be true; but there are certain words which must have the same meaning under all theories; and, in spite of his efforts, he is compelled to employ words which show that neither he nor any one else can maintain consistently a purely subjective conception of Matter,—that is to say, a conception which dispenses with an external agency or force. He says, that "almost all philosophers, who have narrowly exam-

* "Prin. of Hum. Know." § xxvi.
† Ibid. § lvi.

ined the subject, have decided that Substance need only be postulated as a *support* for phenomena, or as a bond of connection to hold a group or series of *otherwise* unconnected phenomena together. Mr. Mill goes on with much simplicity: "Let us only then *think away* the support, and suppose the phenomena to remain, and to be held together in the same groups and series by *some other agency*, or without any agency *but an internal law*—and every consequence follows without Substance, for the sake of which Substance is assumed.* The demand here made upon us, to "*think away*" the support of phenomena is certainly made less formidable when, in the next breath, we are told to *think it back again* under another form of words as "another agency," or as an "internal law."

The same vain attempt to get behind ultimate ideas may be traced in the word "Permanent," with which Mr. Mill qualifies Matter considered as "A Possibility of Sensation." The new formula is "A *Permanent* Possibility of Sensation." Why permanent? Permanent means enduring. But what has the element of Time to do with it? The percipient minds are not permanent, so far as the sensations of their existing organism is concerned. In what sense, then, are the "Possibilities of Sensation" permanent? What is it that is described as permanent? Not the sensations—not the individual sentient beings. What then? Clearly the Power or Agency which causes, or is capable of exciting sensations in organisms that are, or that are to be. Here, then, we have the ideas of Externality and of Causation brought back under the covering of Time. "What is it we mean," asks Mr. Mill, "when we say that the object we preceive is external to us, and not a part of our own thoughts? The reply to this question, in the first Edition, ran as follows: We mean that there *is in our perceptions* something which exists when we are not thinking of it, which existed before we ever thought of it, *and would exist if we were annihilated.*" In the recent Edition, this reply has been altered so as to avoid the obvious absurdity of supposing that things which are conceived to exist only in "our perceptions," could nevertheless continue to exist "if we were annihilated." Accordingly the reply now runs thus: "We mean that there is *concerned in* our perceptions," etc. Yes; but how concerned? As an exciting Force or producing Cause, and in no other way. Similar observations apply to the word "Possibility," as applied in Mr. Mill's Psychological Theory. Possible can only mean Potential. A Possibility of sensation must mean a Potential cause of sensation. And here, again, we have the same fundamental ideas involved in the very language by which it is attempted to evade them.

Mr. Mill appears to me to be equally unsuccessful in starting fairly in this Psychological Theory—that is to say, in the definition of postulates which steer clear of involving the very ideas for which he professes to account. His first postulate is that the Human Mind is capable of Expectation. Certainly; but what does Expectation involve? It involves acts of Memory, and of Comparison, and of Reason. In particular, it involves, or at least he is not entitled to deny that it may involve, the intuitive belief that actual sensations already experienced arose from an external

* Appendix to chaps. xi. and xii. "Mill on Hamilton," 6th ed. p. 246.

cause, and that the same cause is capable of exciting them again. My belief is that the mind cannot place itself in the attitude of expectation without the presence of ideas which involve the whole question in dispute.

I am disposed, therefore, to agree with Mr. Mill, that the existence of an external material world cannot be proved;—just in the same sense, and for the same reason, that the proposition—"Things that are equal to the same thing are equal to one another," cannot be proved.

Mr. Mill thinks that, though the existence of an external Material world cannot be proved, an external Immaterial world can be proved—that is to say, the existence of other minds can be proved. I think he only succeeds in showing that our belief in this existence can be confirmed by corroborative evidence. But such corroboration and confirmation is equally available in support of the belief in the existence of Matter, considered as an External Cause of sensation. The truth is, our knowledge of other minds is only reached through our previous knowledge of Matter, and of the impressions it makes upon us. My own mind, as well as the mind of all the beings around me, is, or seems to be, inseparably connected with a Material Organization, and there are no manifestations of Mind which do not come to me directly or indirectly through material signs.

Mr. Mill has often warned us, and I accept the warning, against the system of discussing metaphysical questions, under the threat, as it were, that the conclusions to which we are opposed are inconsistent with some one or more Theological Beliefs. We know that the Ideal Theory, in the form at least which it took in the hands of Berkeley, was put forward in the interests of Religion. "The existence of matter, or bodies unperceived, has not only been the main support of Atheists and Fatalists, but on the same principle doth Idolatry likewise, in all its various forms, depend. Did men but consider that the sun, moon, and stars, and every other object of the senses, are only so many sensations in their own minds, which have no other existence but barely being perceived, doubtless they would never fall down and worship their own *Ideas*, but rather address homage to that Eternal Invisible Mind which produces and sustains all things." * Such was the animating principle of the Bishop of Cloyne's famous speculation. I confess I have a profound distrust of all attempts to found the teachings of Faith upon the principles of Scepticism. I am not tempted, in order to escape the danger of Materialism, to deny the existence of that, which I know by my own structure, and by the structure of all around me, to be different from Mind. I am content to understand the world as my own faculties have been co-ordinated with external things to reveal those things to me. I look in my friend's face, and I see the expression of power, and of intellect, and of goodness. These are attributes of Mind. I do not know *how* these attributes can be shown forth so evidently in the colors and in the lines of flesh and blood. But I do not try to persuade myself that his hand or his face are the same things, either with the perceptions which they excite in me, or with the emotions which they express in him. I do not pretend to understand the nature of the connection between these Material Forms and

* "Prin. of Hum. Knowl." § xciv.

the qualities of Mind. But after their own diverse kinds and measures they are both equally "real" to me. I will not deceive myself by verbal quibbles—pretending to be able to stand outside myself, and to prove by reason that the very tools with which reason works are rotten in her hands. There is but one sentence in these two chapters of Mr. Mill's work which conveys any really important truth. In regard to the existence of Matter, as well as in regard to the nature of Memory and of Mind, we may indeed well say with him: "By far the wisest thing we can do is to accept the inexplicable facts, without any theory how it takes place; and when we are obliged to speak of them in terms which assume a theory, to use them with a reservation as to their meaning."

NOTE E.—PAGE 178.

When I wrote this passage in the text, I had not read a curious note by Sir W. Hamilton in his edition of Reid's Works.* It is almost droll in its confession of the puzzling significance of such facts, in respect to animals, as those I have referred to. "Nothing in the compass of inductive reasoning appears more satisfactory than Berkeley's Demonstration of the necessity and manner of our learning, by a slow process of observation in comparison alone, the connection between the perception of vision and touch, and, in general, all that relates to the distance and real magnitude of external things. But although the same necessity seems in theory equally incumbent on the lower animals as on man, yet this theory is provokingly(!) —and that by the most manifest experience—found totally at fault with regard to them; for we find that all the animals who possess at birth the power of regulated motion (and these are those only through whom the truth of the theory can be brought to the test of a decisive experiment), possess also from birth the whole apprehension of distance, etc., which they are ever known to exhibit. The solution of this difference by a resort to instinct is unsatisfactory; for instinct is in fact an occult principle—a kind of natural revelation,—and the hypothesis of instinct, therefore, only a confession of our ignorance: and at the same time, if instinct be allowed in the lower animals, how can we determine whether and how far instinct may not in like manner operate to the same result in man?

Well might Sir W. Hamilton ask this question. It is one which Philosophers will find it hard to answer. My own conviction is that more than half the "inductive reasoning" by which men have pretended to account for their intuitive perceptions is altogether unsound. Man, besides being man, is also an animal—and through his animal organization the mechanics of his mind are to a large extent regulated on the same principles which regulate the lower Intelligences around him—that is to say, by processes unconsciously pursued. This is the proper definition of operations which are Instinctive; and, as Sir W. Hamilton observes, they may best be conceived as the result of "Natural revelation."

* Vol. I. p. 182, note.

NOTE F.—PAGE 181.

In the number of the *Dublin Review* for April, 1867, there is an article on "Science, Prayer, Free Will and Miracles," in which some portions of this work are criticised. With much of that criticism I have every reason to be satisfied. The main objection taken may be stated in two sentences. I have said that (under certain limitations as to the meaning of the words) the "abstract predictability of human conduct" may be admitted without involving the denial of anything essential to the doctrine of Free Will. Dr. Ward denounces this concession as absolutely fatal to that doctrine, and maintains that in making such a concession, as well as in other more direct forms of statement, my view comes to be "precisely identical with Mr. Mill's," which, nevertheless, I am "professing" to oppose. This position he proceeds to support by an elaborate argument, which I shall here examine with all the care due to the gravity of the question raised, and to the duty of using no language upon such a subject which is not justified by as much precision of thought as is attainable in regard to it.

As Dr. Ward speaks upon this subject with some warmth of feeling, perhaps I may explain at once that he is mistaken in supposing that I am "a Calvinist," in the sense of holding "the Necessitarian Doctrine." I hold the doctrine of Free Will in the only sense in which it is to me intelligible. I set the highest value upon it; and in the result, though not in this particular argument, I believe I agree with Dr. Ward himself. I am willing to accept without reservation the definition which he quotes from certain Jesuit theologians: "Potentia libera est quæ, positis omnibus requisitis ad agendum, potest agere et non agere." But Dr. Ward does not seem to observe that in this definition the whole question in dispute may be covered under its contingent clause. Everything depends on the further definition to be given of "all the requisites for action." Is, or is not, the condition of the mind itself to be considered as one of those "requisites?" Is knowledge, and the possession of those motives which knowledge gives, a "requisite" or not? Do the "requisites" intended by the Jesuit definition, refer to nothing more than the presence or absence of physical constraint? The truth is, that such abstract definitions go very little way in explanation of themselves. I have asserted the freedom of the Will under several forms of statement which are much more explicit, because much more full and more detailed. Thus, I have said, "Among the motives which act upon mind, Man has a selecting power. He can, as it were, stand out from among them—look down from above them—compare them among each other, and bring them to the test of conscience." This is freedom, if there be such a thing conceivable in thought. But Dr. Ward's impetuous zeal in favor of Free Will blinds him to certain truths which are perfectly compatible with this doctrine, and which not only must be admitted, but must be claimed, if we are ever to wield against Necessitarians the weapon of analysis. The principal object of this work has been to show that, in so far as science has successfully established in physics the idea of the Reign of Law, that idea does not affect or traverse the Reign of Mind,

and the supremacy of Purpose. In like manner, I think it can be shown that in so far as Psychology can successfully establish the idea of Causation, as applicable to Mind, that idea is perfectly compatible with the true freedom of the Will. Dr. Ward says very truly that the Necessitarian doctrine has in all ages been embraced by many powerful minds. This indicates that, in so far as it is false at all, its falseness probably depends on some partial aspects of truth mingled with the fallacies of definition. My own opinion unquestionably is, that when Necessitarians have been compelled to disown and abjure the idea of compulsion, their doctrine ceases to be the doctrine of Necessity at all in any legitimate sense of the word. What I mean by freedom is freedom from compulsion, and nothing else. When I say that the Will is free, I do not mean that its movements can be separated from the inducements internal and external under which it moves. But then I insist that "Motive" shall have the widest meaning—that it shall include such motives, evolved out of the very constitution of the mind itself, as "Love, and Reverence, and Gratitude, and Hunger after Knowledge and Desire of Truth." Of course this is not given as a complete list, but only a sample of the things which must be claimed as "motives." In this sense, not only is the determining power of Motive inseparable from the very idea of Mind; but the higher is the quality of a mind, the more certain and definite will be the motives of its action. By some strange confusion of thought, Dr. Ward seems to regard with horror the idea of the Will being regarded as part of "the constitution of the mind." This is a mere question of words. But if by Will, Dr. Ward does not understand a particular power of mind, I do not know what he means. To analyze Mind at all, we must of course consider its different powers as separate from each other; but it does not the less remain true that they are all parts of one whole. In this point of view, Dr. Ward's own definition of Free Will is far from clear. "The Will, we maintain, has a certain power of deciding *for itself* what weight it shall attach to motives." Certainly, if the Will be understood as including the Deliberative Faculty whose function it is to "weigh." But in coming to this decision it must be guided by something, which something may always itself be resolved into another "motive."

And if this appears to be a mere play on words, I grant it. It is the very point and object of my argument to show that in so far as the Necessitarian doctrine has any apparent force, it does depend on mere ambiguities of language. For example—exclude from the word "motive" all the influences which come upon the spirit from the mind itself—from conscience, from the action upon it of another Spirit, human or divine—confine the word "motive" (as many do, tacitly by implication, though not consciously) to that class of motives which come from external and material things,—in short, confine it to the appetites or desires, then it absolutely ceases to be true that the Will is determined by "motives." On the other hand, include in the word "motive" *all* that can ever influence the mind, whether from within or from without, then it ceases as absolutely to be true that the Will can ever be "free" from such motives. But then, in this

sense, the Necessitarian doctrine resolves itself, as Mr. Mansel says, into the identical proposition that "the prevailing motive prevails." It becomes perfectly harmless, because in reality perfectly unmeaning. Dr. Ward is very indignant that I should represent my view as "a mere truism." But it is not my own view, but the Necessitarian doctrine, when thus reduced by analysis to its real value, which I have represented as a mere truism.

All these fallacies and confusions of thought arise, in my opinion, from neglect of the fact that freedom has no absolute, but only a relative meaning. Freedom can only mean "the not being bound," and bonds can only consist in something binding. Freedom of the Will can only mean that the Will is free from compulsion. If Necessity does not mean compulsion, it either means nothing at all, or nothing inconsistent with freedom when properly defined and understood.

We now come to what is called the "Abstract predictability of human conduct." This is the phrase into which Mr. Mill retreats, as containing the residuum of truth which still belongs to the Necessitarian doctrine after it has abjured the idea of compulsion. It is not my phrase, or one which I approve of, because it involves a great number of assumptions which lie, as it were, concealed within it. But I adhere to the opinion that, when strictly defined, the idea it involves is perfectly capable of being reconciled with the freedom of the Will. The truth is, that it is capable of being resolved into the same identical proposition as the Necessitarian doctrine in other forms.

If by "abstract predictability" is meant that prediction would be possible under the conditions of complete, universal and perfect knowledge, I do not see either how it can be denied, or to what purpose it can be affirmed. The proposition is that, if ALL the conditions were known which determine the Will in deciding for itself, or "in giving weight to motives," the result of that decision would thereby become also known. Of the Necessitarian doctrine expressed in this general form, I have said, and I repeat, that it is "very like a truism." But if it is useless as an affirmation, it is at least not capable of denial. Dr. Ward, however, does deny it, and supports his denial by reasoning which is clearly untenable, as an admission made by himself will show. His idea seems to be, that no "predictable" conduct can be "free;" that nothing which can be abstractedly foreseen can be the result of freedom. But Dr. Ward does not, and cannot maintain this view consistently. He admits that, "taking any given man at any given moment, there are certain things so good, and certain things so bad, that we may infallibly calculate he will do neither the one nor the other." Would Dr. Ward then admit that as regards those "very bad," and those "very good," deeds, this man is not "free?" Or does he think he escapes this difficulty, by putting the man's conduct in the negative instead of the positive form? As regards the action of the Will, no such distinction is of any avail. The not doing one thing is the doing of another. The not doing a very good deed which he has power to do ("positis omnibus requisitis ad agendum"), is willing not to do it. The not doing a very bad deed is willing to do something else. If then the conduct of the man in

those cases "can be calculated with perfect certainty," it is so calculable only because knowledge of his character is convertible into knowledge of the manner in which his Will is sure to act. Is it not then a clear violation, both of the ordinary and of the philosophical use of language, to say that a man is not "free" to do a very bad act, because we know certainly beforehand that his character, and the motives on which he habitually acts, will prevent him from doing it?

But then Dr. Ward proceeds to argue that though infallible calculation may be possible in respect to deeds very good, and very bad, it will not be possible in regard to deeds only a little good and a little bad. But how does this greater difficulty arise? Is it not because the number of motives telling on the Will is greater, more nicely balanced, and therefore less known? And is not this difference precisely the kind of difference which would disappear, if he could pass from knowledge which is partial only, to knowledge which is complete and absolute? But whatever difficulty may arise from imperfect knowledge is (as I understand the phrase) eliminated by the word "abstract," as qualifying "predictability." No one asserts that prediction can be founded on partial knowledge. But the question raised is whether even perfect knowledge of all the elements of motive and of character can render predictable the conduct of a really Free Agent. The question is one involving a logical principle, which, if applicable to the conduct of a Free Agent in any case, must be equally applicable to his conduct in all cases. If it is abuse of terms, or a confusion of thought, to affirm that a man's Will is not free to do or not to do very bad actions, because we can calculate infallibly the decision of his Will in regard to them, it must be equally fallacious to affirm that his Will would not be free in regard to lesser degrees of vice and virtue, if in like manner, we were able from perfect knowledge of his character to predict his conduct also in respect to them. The doctrine of Free Will, like every other doctrine of Mental Science can only be defended by clear definitions of what it is. Its defenders have in my opinion established their case when they have compelled Necessitarians to discard the idea of compulsion. All attempts to deny that the Will is determined by "motives" are futile, and only result in giving a seeming victory to those who have in reality been defeated.

In order to illustrate what I mean, I will suppose a particular case; and to comply with the conditions of Dr. Ward's argument, it shall be a case where no determination, either very good or very bad, is involved. I will suppose that in arguing with a friend on the subject of Free Will, a plate of oranges is offered to me. My friend tells me that "he knows which of these oranges I shall choose." I tell him he cannot possibly know this—that my Will is free, and therefore he cannot predict my choice. He insists upon it that he can. I then observe that one orange has a smoother skin than the others, and is of a deeper yellow color. I then recollect that I had once mentioned in my friend's hearing that I considered a pale color, or a rough skin, as indications of sour or tasteless oranges; and remembering this fact, I at once perceive that my friend is calculating my conduct from a motive which, as he knows, does habitually determine my choice of

oranges. I am conscious also that in this particular case I should have been so determined—if this dispute had not arisen. But in order to show my friend that my Will is really free from this power of "motive," I determine to exert that freedom by choosing the palest, or the roughest orange in the plate, and I accordingly do so. This is an assertion of my Free Will —a practical denial of the doctrine that I am the slave of "motives." But is it not clear in this case, that my conduct has been determined after all only by another and a stronger motive than the one which usually acts with me in the matter—even by the motive of proving to my friend that he was wrong, and that I was right?—a motive which is strong with all men, and is supposed to have special attractions for a Scotchman. And is it not equally clear, that if my friend had had more perfect knowledge of my character, and had known that I recollected the former conversation, and could therefore guess the grounds of his prediction, he might, and would have been able to foresee correctly the new motive which had thus arisen to overpower the other? And finally, is it not equally evident that, if he had been able by this extraordinary sagacity to predict my choice correctly, the correctness of that prediction would not have implied the existence of any constraint on the freedom of my Will, but, on the contrary, would have been founded on his knowledge of my freedom to pass from the old motive and to give effect to the new one?

A thousand different examples of the same kind might be given. That on which the Will finally determines to act may always be called, and is always properly called, a motive. And this is observable in respect to the whole question, that precisely in proportion to the high qualities of any given mind—in proportion to its intellectual power and its moral strength —in proportion to its keen insight into the causes and tendencies of things, and its appreciation of truth and righteousness—in the same proportion will the distinction vanish in its eyes between things "very bad," and things only a little bad. In the same proportion, therefore, will its own conduct be guided by definite and certain motives: in the same proportion, finally, will that conduct become predictable, because in the exercise of its freedom it is governed by moral laws which never change.

NOTE G.—PAGE 181.

Mr. Mahaffy, in his article in the *Contemporary Review*, has taken objection to the breadth of meaning which I have given in this passage to the word "motive." He says, I have "surely fused together two opposite theories under the ambiguous meaning of *motive*." This is precisely what I have done, and what I meant to do. I adopt all that I consider to be true in the so-called Necessitarian Doctrine, which, when cleared from the idea of compulsion, is no doctrine of necessity at all. The residuum of truth is, that the Will must always act on some motive. I have taken also all that is of any value in the Doctrine of Free Will, which is—that among the "motives" of the mind must be reckoned those inducements which arise out of its higher, as well as out of its lower faculties. But Mr. Mahaffy is,

in my opinion, clearly wrong when he objects to the word "motive" being employed with this breadth of meaning. His objection indeed is explained to be that the word "motive" ought not to be applied to the "action of the Will upon itself." But I have not so applied it, because I have no notion what "the action of the Will upon itself" means. Mr. Mahaffy gives a farther explanation of this expression, when he speaks of the Will "creating principles of action for itself." But I deny altogether that the "creating" of anything is the function of the Will. It is by an act of Will that we fix our attention upon any given motive, or turn, on the contrary, our attention from it. But if we are to analyze the mind at all, if for the convenience of thought and of discussion, we are to divide its inseparable Unity into different powers, we must make the division as logical as we can —that is, as consistent as possible with definite ideas of distinct mental functions. In considering the Will as a separate Power, we must strictly confine it to what may be called the Executive of the Mind. In this light it would be altogether incorrect to ascribe the "creation" of any motive to the Will. Motives of all kinds, both the highest and the lowest, may rise, and do rise unbidden in the mind. It is by an act of Will that we summon different motives to the presence of the Deliberative Faculties, that we cherish one and dismiss another, or determine to spend thought and time in making our choice between motives which are conflicting. But the Will cannot with accuracy be said to be the creator of motives. Intellectual and moral conceptions, held together by the bonds of Memory, are the fountains from which the highest motives come. Mr. Mahaffy admits that "anything brought to bear upon the Will *from without itself*, even from the intellectual part of the mind, is a motive." But according to my definition of the Will all motives come equally from outside the Will, and assuredly I see no ground for the distinction Mr. Mahaffy seems to draw between the Intellectual and the Moral faculties. In denying the name of motive to those inducements which come from the affections or from the sense of right and wrong, he imposes a restriction on the meaning of the word which is not less inconsistent with common usage than with philosophical accuracy. Affection and gratitude, the love of man and the love of God, are all surely "motives" in the most proper sense of the term. Yet Mr. Mahaffy asks, "Is it not an abuse of language to say that the man who resists temptation by creating within his breast a strong feeling of moral responsibility is determined by motives?" To this question I reply at once (passing over the question of the "creation" of motives) that it is no abuse of language, but, on the contrary, the employment of language in its natural and ordinary sense. On what principle is the love of knowledge (being intellectual) to be called a motive, if the love of God is not? On what principle is a desire of producing physical results to be called a motive, if the desire of attaining moral ends is denied the name? No such distinction is tenable in a philosophical point of view, and no such distinction is known in the usual and familiar employment of the word "motive." Mr. Mahaffy, however, in making this objection, has put his finger upon the point on which the whole discussion turns. Like many other metaphysical

questions, it depends almost entirely on a definition of terms. If the word "motive" be arbitrarily limited to mental affections of one or two particular kinds, if it be confined to the lower appetites and desires, or even if it be extended to the higher appetites of the Intellect, whilst it is denied to the inducements of morality, of conscience, of Religion,—then it ceases to be true that the mind is determined by motives alone. The result is that the so-called "Necessitarian" Doctrine, in so far as it is true at all, must not only exclude the idea of compulsion, but it must include all that class of inducements, on the pre-existence of which, and on the power of choice among them, the responsibility of the Will depends.

The view presented in the text of the great question of Necessity and Free Will does fuse together some portions of the two opposite Theories which have so long divided men's minds regarding it. But in this fusion I do but follow the process pursued by Dante in a profound and beautiful passage of his "Purgatorio" (Canto 18th). To Necessity he ascribes the existence and the power of Motive. Motives arise out of the relations pre-established between the Human Spirit and all the Influences by which it is surrounded. No other account can be given of them. Dante sees no difficulty, as some modern defenders of the Free Will doctrine do, in comparing the ultimate nature and origin of all our mental desires with the nature and origin, equally inexplicable, of the Instincts of the lower animals. Hear the lines, not less musical in sense then they are in sound—

"Però, là onde venga lo intelletto
Delle prime notizie, uomo non sape
E de' primi appetibili l'affetto;
Che sono in voi, sì come studio in ape
Di far lo mele."

To Free Will he ascribes the power of Counsel—of deliberation and of choice among the motives which thus arise from the very nature and constitution of the Mind. This power guards the "Threshold of Assent:"—

"Innata v'è la virtù che consiglia,
E dell' assenso de' tener la soglia."

On this power depends the responsibility of conduct:—

"Quest' è'l principio là onde si piglia
Cagion di meritare in voi, secondo
Che buoni amori o rei accoglie e viglia.

The passage closes with these beautiful and striking lines:—

"Color che ragionando andaro al fondo
S'accorser d'esta innata libertate;
Però moralità lasciaro al mondo.
Onde pognam che di necessitate
Surga ogni amor, che dentro a voi s'accende;
Di ritenerlo è in voi la potestate."

It would be difficult to give so much philosophy in fewer words.

NOTE H.—PAGE 184.

In the last edition of Mr. Mill's work (1867), he has made an addition to the sentence quoted in the text, so that it now runs thus:—"I deny it as strenuously as any one, *in the case of human volitions, but I deny it just as much of all other phenomena.*" If Mr. Mill means, by this addition, to imply that he can deny compulsion (for example) in the behavior of a billiard-ball, when it is struck, "just as much" as he can deny it, of the behavior of a man when he is insulted, he renders his previous explanation valueless, and restores again to the doctrine of Necessity that very element of meaning which he professes to disclaim. Compulsion is predicable of the effects of Physical Force exerted upon Matter, in a sense in which it is not predicable of the effects of Moral or Intellectual inducements exerted upon Mind. This is precisely the distinction which Necessitarians are perpetually confounding; and so long as they do confound it, their doctrine is justly open to the objection implied in the name usually assigned to it. Even if it be true, as Mr. Mill holds, that we have no other idea of Physical Causation than that of uniform and invariable sequence,—no idea of Necessity in Causation,—still it remains true that Compulsion is, apparently to us, involved in the effects of Physical Forces upon Matter, in a sense in which it is not involved in the effects of "Motive" upon Mind.

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THE DIPPER, OR WATER-OUSEL.

THE

UNITY OF NATURE.

BY

THE DUKE OF ARGYLL.

AUTHOR OF "THE REIGN OF LAW."

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PREFACE.

As explained in the Preface to the first Edition of the "Reign of Law," published in 1866, I had intended to follow the chapter on Law in Politics with a concluding chapter on Law in Christian Theology. It was natural to reserve for that chapter all direct reference to some of the most fundamental facts of Human Nature. Yet, without such reference, the Reign of Law, especially in the Realm of Mind, could not even be approached in some of its very highest and most important aspects. At that time, however, I shrank from entering upon questions so profound, of such critical import, and so inseparably connected with religious controversy.

Further reflection has convinced me that the great subject of Law in Christian Theology is not only incapable of being treated in a single chapter, but cannot even be entered upon at all without preparatory investigations and preparatory arguments which it would take volumes to exhaust. What has to be done, in the first place, is to establish some method of inquiry, and to find some secure avenue of approach. Before dealing with any part of the Theology which is peculiarly Christian, we must trace the connection between the Reign of Law and the ideas which are alike fundamental to all Religions, and inseparable from the facts of Nature. It is to this preliminary work that the following chapters have been devoted. Modern Doubt has called in question not only the whole subject of inquiry, but the whole Faculties by which it can be pursued. Until these have been tested and examined by some standard which is elementary and acknowledged, we cannot even begin the work.

It has appeared to me that not a few of the problems which lie deepest in this inquiry, and which perplex us most, are soluble in the light of the Unity of Nature. Or if these problems are not entirely soluble in this light, at least they are broken up

by it, and are reduced to fewer and simpler elements. T
following chapters are an attempt to follow this concept
along a few of the innumerable paths which it opens up, a
which radiate from it through all the phenomena of the U
verse, as from an exhaustless centre of Energy and of Sugg
tion.

It is the great advantage of these paths that they are alm
infinite in number and equally various in direction. To th
who walk in them nothing can ever come amiss. Every subj
of interest, every object of wonder, every thought of myste
every obscure analogy, every strange intimation of likeness
the midst of difference—the whole external and the wh
internal world—is the province and the property of him w
seeks to see and to understand the Unity of Nature. It is
thought which may be pursued in every calling—in the busi
hours of an active life, and in the calmest moments of rest and
reflection. But if, in the wanderings of our own spirit, and
the sins and sorrows of Human Life, there are terrible fa
which resist all classification and all analysis, it will be a go
result of our endeavors to comprehend the Unity of Natu
should it lead us better to see, and more definitely to understa
those features in the character of Man which constitute T
Great Exception.

I commend these chapters to the consideration of those w
care for such inquiries. Like the earlier Work, of which t
is a sequel, much of it has appeared separately in other forr
These portions have all been reconsidered, and to some ext
re-written ; whilst a new meaning has been given to the reas
ing they contain by the place assigned to them in a connec
Treatise. The chapters which were published last year
articles in the *Contemporary Review* called forth some cr
cisms from writers both in England and America from wh
I have derived advantage.

ARGYLL

INVERARAY, *Dec.*, 1883.

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THE UNITY OF NATURE.

CHAPTER I.

GENERAL DEFINITIONS AND ILLUSTRATIONS OF THE UNITY OF NATURE—WHAT IT IS AND WHAT IT IS NOT.

THE System of Nature in which we live impresses itself on the mind as one System. It is under this impression that we speak of it as the Universe. It was under the same impression, but with a conception specially vivid of its order and its beauty, that the Greeks called it the Kosmos. By such words as these, we mean that Nature is one Whole—a Whole of which all the parts are inseparably united—joined together by the most curious and intimate relations, which it is the highest work of Observation to trace, and of Reason to understand.

I do not suppose that there is any need of proving this—of proving, I mean, that this is the general impression which Nature makes upon us. It may be well, however, to trace this impression to its source—to see how far it is founded on definite facts, and how far it is strengthened by such new discoveries as science has lately added to the knowledge of Mankind.

One thing is certain: that whatever science may have done, or may be doing, to confirm Man's idea of the Unity of Nature, science, in the modern acceptation of the term, did not give rise to it. The idea had arisen long before science in this sense was born. That is to say, the idea existed before the acquisition of physical knowledge had been raised to the dignity of a pursuit, and before the methods and the results of that pursuit had been reduced to system. Theology, no doubt, had more to do with it. The idea of the Unity of Nature must be at least as old as the idea of one God: and even those who believe in the derivation of Man from the Savage and the

Brute, cannot tell us how soon the Monotheistic doctrine arose. The Jewish literature and traditions, which are at least among the oldest in the world, exhibit this doctrine in the purest form, and represent it as the doctrine of primeval times. The earliest indications of religious thought among the Aryan races point in the same direction. The records of that mysterious civilization which had been established on the Nile at a date long anterior to the Call of Abraham, are more and more clearly yielding results in harmony with the tradition of the Jews. The Polytheism of Egypt is being traced and tracked through the many and the easy paths which lead to the fashioning of many Gods out of the attributes of One.*

Probably those who do not accept this conclusion as historically proved may hold rather that the idea of the Unity of Nature preceded the idea of the Unity of God, and that Monotheism is but the form in which that earlier idea became embodied. It matters not, so far as my present purpose is concerned, which of these two has been the real order of events. If the law prevailing in the infancy of our race has been at all like the law prevailing in the infancy of the individual, then Man's first Beliefs were derived from Authority, and not from either reasoning or observation. I do not myself believe that in the morning of the world Theism arose as the result of philosophical speculation, or as the result of Imagination personifying some abstract idea of the Unity of external Nature. But if this were possible, then it would follow that while a perception of the Unity of Nature must be at least as old as the idea of one Creator, it may be a good deal older. Whether the two ideas were ever actually separated in history, it is certain that they can be, and are, separated at the present time. A sense and a perception of the Unity of Nature—strong, imaginative, and almost mystic in its character—is now prevalent among men over whom the idea of the personal agency of a living God has, to say the least, a much weaker hold.

What, then, is this Unity of Nature? Is it a fact or an imagination? Is it a reality or a dream? Is it a mere poetic fancy incapable of definition, or is it a conception firmly and legitimately founded on the phenomena of the world?

* Renouf, "Hibbert Lectures," 1879, p. 89.

But there is another question which comes before these. What do we mean by unity? In what sense can we say that an infinite number and variety of things are nevertheless one? This is an important question, because it is very possible to look for the Unity of Nature in such a manner that, instead of extending our knowledge, or rendering it more clear and definite, we may rather narrow it, and render it more confused. It has been said that all knowledge consists in the perception of difference. This is not accurate; but it is true that the perception of difference is the necessary foundation of all knowledge. For if it be possible to give any short definition of that in which essentially all knowledge consists, perhaps the nearest approach to such a definition would be this: that knowledge is the perception of relations. To know a thing and to understand it, is to know it in its relation to other things. But the first step in this knowledge is to know it as distinguished from other things. The perception of mere difference comes before the perception of all other and higher relations.

It is well, therefore, to remember that no increase of knowledge can be acquired by a wilful confounding or a careless forgetfulness of distinctions. We may choose to call two things one, because we choose to look at them in one aspect only, and to disregard them in other aspects quite as obvious, and perhaps much more important. And thus we may create a unity which is purely artificial, or which represents nothing but a comparatively insignificant incident in the System of Nature. For as things may be related to each other in an infinite variety of ways—in form, or in size, or in substance, or in position, or in modes of origin, or in laws of growth, or in work and function—so there are an infinite number and variety of aspects in which unity can be traced. And these aspects rise in an ascending series according to the completeness of our knowledge of things, and according to the development of those intellectual faculties by which alone the higher relations between them can be perceived. For the perception of every relation, even that of mere physical continuity, is purely the work of Mind, and this work can only be performed in proportion to the materials which are supplied, and to the power of interpretation which is enjoyed. It is very easy to

rest satisfied with the perception of the commoner and more obvious relations of things to each other, and even to be so engrossed with these as to be rendered altogether incapable of perceiving the finer and less palpable relations which constitute the higher aspects of the Unity of Nature. New relations, too, which are by no means obvious, but on the contrary can only be discovered by laborious analysis, may from the mere effect of novelty, engross attention far beyond their real importance. Nay, more—it may be said, with truth, that this is a danger which, for a time at least, increases with the progress of science, because it must obviously beset special subjects of inquiry and special methods of research. The division of labor necessarily becomes more and more minute with the complication of the work which is to be done, and branches out into a thousand channels of inquiry, each of which finds its natural termination in the ascertainment of some one special series of relations. The Chemist is engaged with the elementary combinations of matter, and finds a unity of composition among things which in all other aspects are totally diverse. The Anatomist is concerned with structure, and separates widely between things which may nevertheless be identical in chemical composition. The Physiologist is concerned with function: and, finding the same offices performed by a vast variety of structures, ranges them across all their differences under a single name. The Comparative Anatomist is concerned with the relative place or position of the parts in Organic structures; and, although he finds the same part in different creatures performing widely different functions, he nevertheless pronounces them to be the same, and to be one in the homologies of an ideal archetype. But each of these inquirers may be satisfied with the particular unity which his own investigations lead him specially to observe, and may be blind altogether to the unity which is next above it.

Nor is it specialists alone who are in danger of forming narrow and inadequate conceptions of the Unity of Nature. Minds whose tendency it is to generalize are even more exposed to this danger than minds whose passion it is to investigate and arrange a particular class of facts. The work of generalization is essentially a work of selection—the selection and separation

of that which is essential from that which is comparatively unimportant, in the great connecting lines of Nature. If in this work the principle of selection be a wrong one—if it be founded on a narrow conception and a very partial understanding of the facts—if the great lines are not seen to be what they really are, and if little divergent lines are followed in their stead—then the most ambitious generalizations of science may be far more deceiving than the most despised of vulgar errors. For indeed these errors are sometimes errors only in their form, whilst in substance they are often full of spirit and of truth. In them, not seldom, the popular eye has caught and reflected the masses of the forest which the man of science has been prevented from seeing by the trees. And so it may well be that the sense of unity in Nature, which Man has had from very early times, reflected in such words as the "Universe," and in his belief in one God, is a higher and fuller perception of the truth than is commonly attained either by those who are engrossed in the laborious investigation of details, or by those who struggle to compress all the wealth of Nature within some abstract formula of the laboratory or of the workshop. This is one of the many cases in which the Intuitions of the Mind have preceded inquiry, and gone in advance of science, leaving nothing for systematic investigation to do, except to confirm, by formal proofs, that which has been already long felt and known.

I have already indicated the sense in which the Unity of Nature impresses itself on the Intelligence of Man. It is in that intricate dependence of all things upon each other which makes them appear to be parts of one System. And even where the connection falls short of dependence, or of any visible relation, the same impression of unity is conveyed in the prevalence of close and curious analogies which are not the less striking when the cause or the reason of them is unknown.

I propose in this chapter to specify some of the signs of unity which the study of Nature has more definitely revealed, and consider how far they carry us.

There is one sign of unity, which, of itself, carries us very far indeed. It is the sign given to us in the ties by which this

world of ours is bound to the other worlds around it. There is no room for fancy here. The truths which have been reached in this matter have been reached by walking in the paths of rigorous demonstration. This Earth is part of the vast Mechanism of the Heavens. The force, or forces, by which that mechanism is governed are forces which prevail not only in our own Solar System, but, as there is reason to believe, through all Space, and are determining, as astronomers tell us, the movement of our Sun, with all its Planets, round some distant centre, of which we know neither the nature nor the place. Moreover, these same forces are equally prevailing on the surface of this Earth itself. The whole of its physical phenomena are subject to the conditions which they impose.

If there were no other indications of unity than this, it would be almost enough. For the unity which is implied in the Mechanism of the Heavens is indeed a unity which is all-embracing and complete. The structure of our own Bodies, with all that depends upon it, is a structure governed by, and therefore adapted to, the same force of gravitation which has determined the form and the movements of myriads of worlds. Every part of the human Organism is fitted to conditions which would all be destroyed in a moment if the forces of gravitation were to change or fail. It is, indeed, evident that a force such as this must govern the whole order of things in which it exists at all. Every other force must work, or be worked, in subordination to it.

Nor is gravitation the only agency which brings home to us the unity of the conditions which prevail among the worlds. There is another: Light—that sweet and heavenly messenger which comes to us from the depths of Space, telling us all we know of other worlds, and giving us all that we enjoy of life and beauty on our own. And there is one condition of unity revealed by Light which is not revealed by gravitation. For, in respect to gravitation, although we have an idea of the *measure*, we have no idea of the *method*, of its operation. We know with precision the numerical rules which it obeys, but we know nothing whatever of the way in which its work is done. But in respect to Light we have an idea not only of the measure, but of the mode of its operation. In one sense, of course, Light is

a mere sensation in ourselves. But when we speak of it as an external thing, we speak of the cause of that sensation. In this sense, Light is a wave, or an undulatory vibration, and such vibrations can only be propagated in a medium which, however thin, must be material. That this substance is at all like the chemical substance that we call "ether," is of course a metaphor. It is a good metaphor only in so far as the vapor of ether represents to us a form of Matter which is very thin, invisible, and impalpable. But although the application of this word to the medium in which Light is propagated is a metaphor, it is wholly erroneous to say, as is often said, that the existence of the medium is an hypothesis. The existence of some medium is as certain as any other fact in physics. A vibration, or an undulation, has no meaning except that of a movement in the particles of a material substance. Those who have disputed or doubted the use of the word "ether" as involving an hypothesis have been obliged to admit of a material medium in some form or other. Light, therefore, reveals to us the fact that we are united with the most distant worlds, and with all intervening space, by some ethereal atmosphere, which embraces and holds them all.

Moreover, the enormous velocity with which the vibrations of this atmosphere are propagated proves that it is a substance of the closest continuity, and of the highest tension. The tremors which are imparted to it by luminous bodies rush from particle to particle at the rate of 186,000 miles in a second of time; and thus, although it is impalpable, invisible, and imponderable, we know that it is a medium infinitely more compact than the most solid substances which can be felt and weighed. It is very difficult to conceive this, because the waves or tremors which constitute Light are not recognizable by any sense but one; and the impressions of that sense give us no direct information on the nature of the medium by which those impressions are produced. We cannot see the luminiferous medium except when it is in motion; and not even then, unless that motion be in a certain direction towards ourselves. When this medium is at rest we are in utter darkness, and so are we also when its movements are rushing past us, but do not directly impinge upon us. The luminiferous medium is, there-

fore, in itself, invisible; and its nature can only be arrived at by pure reasoning—reasoning, of course, founded on observation, but observation of rare phenomena, or of phenomena which can only be seen under those conditions which Man has invented for analyzing the operations of his own most glorious Sense. And never, perhaps, has Man's inventive genius been more signally displayed than in the long series of investigations which first led up to the conception, and have now furnished the proof, that Light is nothing but the undulatory movement of a substantial medium.

It is very difficult to express in language the ideas upon the nature of that medium which have been built up from the facts of its behavior. It is difficult to do so, because all the words by which we express the properties of Matter refer to its more obvious phenomena—that is to say, to the direct impressions which Matter makes upon the senses. And so, when we have to deal with forms of Matter which do not make any impressions of the same kind—forms of Matter which can neither be seen, nor felt, nor handled, which have neither weight, nor taste, nor smell, nor aspect—we can only describe them by the help of analogies as near as we can find. But as regards the qualities of the medium which causes the sensation of Light, the nearest analogies are remote, and what is worse, they compel us to associate ideas which elsewhere are so dissevered as to appear almost exclusive of each other. It is now more than three quarters of a century since Dr. Thomas Young astonished and amused the scientific world by declaring of the luminiferous medium that he "was disposed to believe that it pervades the substance of all material bodies with little or no resistance as freely as the air moves through a grove of trees."* This suggests the idea of an element of extreme tenuity. And yet that element cannot be said to be thin in which a wave is transmitted with the enormous velocity of Light. On the contrary, its molecules must be in closest contact with each other when a tremor is carried by them through a thickness of 186,000 miles in a single second. Accordingly, Sir J. Herschel has declared that the luminiferous ether must be conceived of not as an air, nor as a fluid, but rather as a solid—"in this sense at least, that

* Works of Dr. Young, vol. i. p. 188. Bakerian Lecture, Nov. 24, 1803.

its particles cannot be supposed as capable of interchanging places, or of bodily transfer to any measurable distance from their own special and assigned localities in the universe." * Well may Sir J. Herschel add that "this will go far to realize (in however unexpected a form) the ancient idea of a crystalline orb." And thus the wonderful result of all investigation is that this Earth is in actual rigid contact with the most distant worlds in space—in rigid contact, that is to say, through a medium which touches and envelopes all, and which is incessantly communicating from one world to another the minutest vibrations it receives.

The laws, therefore, and the constitution of Light, even more than the law of gravitation, carry up to the highest degree of certainty our conception of the Universe as one;—one, that is to say, in virtue of the closest mechanical connection, and of the prevalence of one universal medium.

Moreover, it is now known that this medium is the vehicle not only of Light, but also of Radiant Heat, whilst it has likewise a special power of setting up, or of setting free, the mysterious action of Chemical Affinity. The beautiful experiments have become familiar by which these three kinds of energy can be separated from each other in the solar spectrum, and each of them can be made to exhibit its peculiar effects. With these again the forces of Galvanism and Electricity have some very intimate connection, which goes far to indicate like methods of operation in some prevailing element. Considering how all the forms of Matter, both in the Organic and in the Inorganic worlds, depend on one or other, or on all of these—considering how Life itself depends upon them, and how it flickers or expires according as they are present in due proportion—it is impossible not to feel that in this great group of powers, so closely bound up together, we are standing very close indeed to some pervading, if not universal, agency in the mechanism of Nature.

There are, however, a great many things in Nature to which we may stand very close indeed without being able to see them clearly, or to understand them at all. And this is the case with that great Pentarchy of Physical Forces which is consti-

* "Familiar Lectures on Scientific Subjects," p. 285.

tuted by Heat, Light, Magnetism, Electricity, and Chemical Affinity. The relations between them are as intimate as they are obscure. But the nature of those relations, in so far as they are known, is pre-eminently suggestive of a unity which is founded on the co-ordination of agencies not in themselves identical, but, on the contrary, separated from each other by distinctions as profound as any which can prevail in physics. Writers and lecturers on Science are very apt to speak of these Forces as capable of being "transmuted" or "converted" into each other. But this is a loose and inaccurate representation of the facts. Carbon can be converted or transmuted into a diamond under certain conditions by a process which, so far as we know, adds nothing to it and takes nothing from it. Under both aspects it is the same substance with no element subtracted, and no new element introduced. It has simply had its structure altered by a re-arrangement of its particles. But no such identity can be asserted of the five great Physical Forces of which we are speaking now. It is true, indeed, that each of them seems sometimes to pass into the other, but only as one thing may be said to pass into another when that other is produced by its antecedent. Mechanical motion in the form of a blow struck against living flesh will inflict upon that flesh a wound. But it would hardly be correct to say that the motion of the blow is transmuted into extravasated blood. In like manner when a skilful Savage twirls one dry stick upon another in a particular manner, he produces by the motion fire. But it would be an erroneous description of the fact to say that the muscular strength of the Savage is transmuted into flame.

Yet this, or something like this, is the nature of the sequence between the Physical Forces which is commonly described as transmutation. In all these cases there are incidents necessary to the effect which are due to other elements than are to be found in the apparently producing cause. There is this peculiarity, however, in the connection between the Physical Forces—that they may all interchangeably be either the cause or the consequence of each other. Mechanical Motion is the most common antecedent of them all. It will give rise to Light and Heat, whilst Heat and Light will both give rise

to mechanical Motion. In like manner Heat and Light will give rise to Electricity, whilst, conversely, Electricity will give rise to Heat and Light. Again, Electricity will give rise to Magnetism, and Magnetism, when accompanied—but only when accompanied—by mechanical movement, will generate powerful currents of Electricity. These currents, again, are so closely connected with Chemical Force that they are the most powerful of all agents in setting that Force free to exert its selective energy. So intimate is this connection that Electricity has been described as Chemical Force in motion—passing from one point of action to another through a chain of intervening substances. And yet the identification of Voltaic Electricity with Chemical Force eludes us again when it is considered that in itself it has no chemical effect (so far as is known) on the matter through which it passes by conduction. The wires which complete the circuit in a Voltaic battery suffer no decomposition or chemical change, although such a change is the origin of the current at one end, and is again the result of it at the other end. Chemical action will not arise except under special conditions. But when these conditions are present it will produce all the "correlated" forces, Heat, Light, Magnetism, and Electricity, whilst, conversely, all these forces either produce or stimulate or intensify Chemical Action.

This great cycle of Forces, therefore, constitutes, as it were, an endless chain, every link of which is in one sense separate from, and in another sense is united to, the rest. Each, regarded by itself, is distinguished by important differences from the others. The mechanical motion of a cannon-ball is a very different thing from the molecular vibration which it produces when that motion is stopped by a resisting body. Magnetism is very different from Electricity, inasmuch as in itself Magnetism is statical, whereas Electricity is active. Magnetism, too, differs from other forms of Force in the great distinguishing feature of polarity,—so that every body which is magnetic is the seat of a dual force acting in opposite directions with equal energy. Moreover, this duality of direction in the action of Magnetic Force is inherent in every particle of the body, so that the minutest fragment of it manifests the same opposite-ness as the whole mass. Chemical Affinity is the most mys-

terious of all the Physical Forces,—that of which it is most difficult to form any clear conception. But one characteristic of this Force is that it depends on difference or heterogeneousness in the composition of the matter which it affects. What the ultimate connection really is which exists between Forces in other respects so separate or distinct, is as yet one of the mysteries of science. Suspicion, if it be nothing more—that kind of surmise which in physical investigations has so often preceded discovery—points to that mysterious medium which from its most obvious function has been called the luminiferous ether. If movements in that medium constitute all that we know of one or two of the correlated Forces, it seems more than probable that it is at least an essential element in them all.

This close connection of so many various phenomena with different kinds of movement in a single medium is by far the most striking and instructive speculation of modern science. It supplies to some extent a solid physical basis, and one veritable cause for part, at least, of the general impression of unity which the aspects of Nature leave upon the mind. For all work done by the same implement generally carries the mark of that implement, as it were of a tool, upon it. Things made of the same material, whatever they may be, are sure to be like in those characteristics which result from identical or from similar properties and modes of action. And so far, therefore, it is easy to understand the constant and close analogies which prevail in that vast circle of phenomena which are connected with Heat, Light, Electricity, Magnetism, and Chemical Affinity.

But although the employment of one and the same agency in the production of a variety of effects is, no doubt, one cause of the visible unity which prevails in Nature, it is not the only cause. The same close analogies exist where no such identity of agency can be traced. Thus the mode in which the atmosphere carries Sound is closely analogous to the mode in which the luminiferous medium carries Light. But this medium and the atmosphere are two very different agents, and the similarity of the laws which the undulations of both obey is due to some other and some more general cause of unity than identity

of material. This more general cause is to be found, no doubt, in one common law which determines the forms of motion in all Matter, and especially in highly elastic media.

But, indeed, the mere physical or mechanical unity which consists in the action of one great vehicle of power, even if this were more universally prevalent than it is known to be, is but the lowest step in the long ascent which carries us up to a unity of a more perfect kind. The means by which some one single implement can be made to work a thousand different effects, not only without interference, and without confusion, but with such relations between it and other agents as to lead to complete harmonies of result, are means which point to some unity behind and above the implement itself—that is to say, they point to some unity in the method of its handling, in the management of the impulses which, receiving, it conveys, and in the arrangement of the materials on which it operates.

No illustration can be given of this higher kind of unity which is half so striking as the illustration which is afforded by the astonishing facts now familiar as to the composition of Solar Light. When we consider that every color in the Spectrum represents the motion of a separate wave or ripple, and that in addition to the visible series there are other series, one at each end of the luminous rays, which are non-luminous, and therefore invisible—all of which consist of waves equally distinct; when we consider farther that all these are carried simultaneously with the same speed across millions of miles; that they are separable, and yet are never separated; that they move accurately together, without jostling or confusion, in perfect combination, yet so that each shall be capable of producing its own separate effect—it altogether transcends our faculties of imagination to conceive how movements of such infinite complication can be united in one such perfect order.

And be it observed that the difficulty of conceiving this is not diminished, but increased, by the fact that these movements are propagated in a single medium; because it is most difficult to conceive how the particles of the medium can be so arranged as to be capable of conveying so many different kinds of motion with equal velocities and at the same instant of time. It is clear that the unity of effect which is achieved out of this

immense variety of movements is a unity which lies altogether behind the mere unity of material, and is traceable to some one order of arrangement under which the original impulses are conveyed. We know that in respect to the waves of Sound, the production of perfect harmonies among them can only be attained by a skilful adjustment of the instruments, whose vibrations are the cause and the measure of the aerial waves which, in their combination, constitute perfect music. And so, in like manner, we may be sure that the harmonies of the Spectrum, effected as they are amongst an infinite number and variety of motions very easily capable of separation and disturbance, must be the result of some close adjustment between the constituent element of the conveying medium and the constituent elements of the luminous bodies whose complex, but joint, vibrations constitute that embodied Harmony which we know as Light. Moreover, as this adjustment must be close and intimate between the properties of the ether and the nature of the radiating bodies whose vibrations it repeats, so also must the same adjustment be equally close between these vibrations and the properties of Matter—both the living and the not-living—on which they exert such a powerful influence. And when we consider the number and the nature of the things which this adjustment must include—how it embraces the whole Organic and the whole Inorganic world, and every combination of the two—we can, perhaps, form some idea of what a bond and bridge it is between the most stupendous phenomena of the Heavens and the minutest phenomena of Earth. For this adjustment must be perfect between these several things—first, the flaming elements in the Sun which communicate the different vibrations in definite proportion; next, the constitution of the medium, which is capable of conveying them without division, confusion, or obstruction; next, the constitution of our own atmosphere, so that neither shall it distort, nor confuse, nor quench the waves; and lastly, the constitution of those forms of Matter upon Earth which respond, each after its own laws, to the stimulus it is so made as to receive from the heating, lighting, and chemical undulations.

In contemplating this vast System of Adjustment, it is important to analyze and define, so far as we can, the impression

of unity which it makes upon us; because the real scope and source of this impression may very easily be mistaken. It has been already pointed out that we can only see likeness by first seeing difference, and that the full perception of that in which things are unlike is essential to an accurate appreciation of that in which they are the same. The classifying instinct must be strong in the human mind, from the delight it finds in reducing diverse things to some one common definition. And this instinct is founded on the power of setting differences aside, and of fixing our attention on some selected conditions of resemblance. But we must remember that it depends on our width and depth of vision whether the unities which we thus select in Nature are the smallest and the most incidental, or whether they are the largest and the most significant. And, indeed, for some temporary purposes—as, for example, to make clear to our minds the exact nature of the facts which science may have ascertained—it may be necessary to classify together as coming under one and the same category, things as different from each other as light from darkness. Nor is this any extreme or imaginary case. It is a case actually exemplified in a lecture by Professor Tyndall, which is entitled "The Identity of Light and Heat." Yet those who have attended the expositions of that eminent physical philosopher must be familiar with the beautiful experiments which show how distinct in another aspect are Light and Heat; how easily and how perfectly they can be separated from each other; how certain substances obstruct the one and let through the other; and how the fiercest heat can be raging in the profoundest darkness. Nevertheless, there is more than one mental aspect,—there is more than one method of conception,—in terms of which these two separable powers can be brought under one description. Light and Heat, however different in their effects—however distinct and separable from each other—can both be regarded as "Forms of Motion" among the particles of Matter. Moreover, it can be shown that both are conveyed or caused by waves, or undulatory vibrations in one and the same ethereal medium. And the same definition applies to the most active chemical rays, which again are separable and distinct from the rays both of Light and Heat.

But although this definition may be correct as far as it goes, it is a definition nevertheless which slurs over and keeps out of sight distinctions of a fundamental character. In the first place, it takes no notice of the absolute distinction between Light or Heat considered as sensations of our Organism or as states of consciousness, and Light or Heat considered as the external agencies which produce these sensations in us. Sir W. Grove has expressed a doubt whether it is legitimate to apply the word "Light" at all to any rays which do not excite the sense of vision. This, however, is not the distinction to which I now refer as confounded when Light is identified with Heat. The confusion to which Sir W. Grove objects between visible and invisible rays is a confusion of language only. He puts that confusion clearly when he says, "Invisible light is darkness, and if it exist then is darkness light." * If it be an ascertained fact, or if it be the only view consistent with our present knowledge, that the ethereal pulsations which do, and those which do not, excite in us the sense of vision, are pulsations exactly of the same kind and in exactly the same medium, and that they differ in nothing but in periods of time or length of wave, so that our seeing of them or our not seeing of them depends on nothing but the focussing, as it were, of our eyes, then the inclusion of them under the same word Light involves no confusion of thought. We should confound no distinction of importance, for example, by applying the same name to grains of sand which are large enough to be visible, and to those which are so minute as to be wholly invisible even to the microscope. And if a distinction of this nature—a mere distinction of size, or of velocity, or of form of motion, were the only distinction between Light and Heat—it might be legitimate to consider them as identical, and to call them by the same name. But the truth is that there are distinctions between them of quite another kind. Light, in the abstract conception of it, consists in undulatory vibrations in the pure ether, and in these alone. They may or may not be visible—that is to say, they may or may not be within the range of our Organs of vision, just as a sound may or may not be too faint and low, or too fine and high, to be audible to our ears. But the word "Heat" carries quite a different meaning,

* "Correlation and Continuity of the Physical Forces," p. 30, ed. 1874.

and the conception it conveys could not be covered under the same definition as that which covers Light. Heat is inseparably associated in our minds with, and does essentially consist in certain motions, not of pure ether, but of the molecules of solid or ponderable matter. These motions in solid or ponderable matter are not in any sense identical with the undulatory motions of pure ether which constitute Light. Consequently, when physicists find themselves under the necessity of defining more closely what they mean by the identity of Heat and Light, they are obliged to separate between two different kinds of Heat—that is to say, between two wholly different things, both covered under the common name of Heat—one of which is really identical in kind with Light, and the other of which is not. "Radiant" Heat is the kind, and the only kind of Heat which comes under the common definition. "Radiant" Heat consists in the undulatory vibrations of pure ether which are set up or caused by those other vibrations in solid substances or ponderable matter, which are Heat more properly so called. Hot bodies communicate to the surrounding ethereal medium vibrations of the same kind with Light, some of these being, and others not being, luminous to our eyes. Thus we see that the unity or close relationship which exists between Heat and Light is not a unity of sameness or identity, but a unity which depends upon and consists in correspondences between things in themselves different. It has been suggested* that the facts of Nature would be much more clearly represented in language if the old word "Caloric" were revived, in order to distinguish one of the two very different things which are now confounded under the common term "Heat"—that is to say, Heat considered as molecular vibration in solid or ponderable matter, and Heat considered as the undulatory vibrations of pure ether which constitute the "Heat" called "radiant." Adopting this suggestion, the relation between Light and Heat as these relations are now known to science, may be thrown into the following propositions, which are framed for the purpose of exhibiting distinctions not commonly kept in view:

* By Sir W. Thomson. Professor Balfour Stewart calls it "absorbed heat"—"to distinguish it from radiant heat, which is a very different thing" ("Conservation of Enegy," p. 80).

I. Certain undulatory vibrations in pure ether alone are Light, either (1) visible, or (2) invisible.

II. These undulatory vibrations in pure ether alone are not Caloric.

III. No motions of any kind in pure ether alone are Caloric.

IV. Caloric consists in certain vibratory motions in the molecules of ponderable matter or substances grosser than the ether, and these motions are not undulatory.

V. The motions in ponderable matter which constitute Caloric set up or propagate in pure ether the undulatory vibrations which constitute Light.

VI. Conversely, the undulatory vibrations in pure ether which constitute Light set up or propagate in grosser matter the motions which are Caloric.

VII. But the motions in pure ether which are Light cannot set up or propagate in all ponderable matter equally the motions which are Caloric. Transparent substances allow the ethereal undulations to pass through them with very little Caloric motion being set up thereby; and if there were any substance perfectly transparent, no Caloric motion would be produced at all.

VIII. Caloric motions in ponderable matter can be and are set up or propagated by other agencies than the undulations of ether, as by friction, percussion, etc.

IX. Caloric, therefore, differs from Light in being (1) motion in a different medium or in a different kind of matter; (2) in being a different kind of motion; (3) in being producible without, so far as known, the agency of Light at all. I say "so far as known," because as the luminiferous ether is ubiquitous, or as, at least, its absence cannot anywhere be assumed, it is possible that in the calorific effects of percussion, friction, etc., undulations of the ether may be always an essential condition of the production of Caloric.

It follows from these propositions that there are essential distinctions between Light and Heat, and that the effect of luminiferous undulations or "Radiant" Heat in producing Caloric in ponderable matter depends entirely upon, and varies greatly in accordance with, the constitution or structure of

the substances through which it passes, or upon which it plays.

The same fundamental distinction applies to those ethereal undulations which produce the effects called Chemical. No such effects can be produced upon substances except according to their special structure and properties. Their effect, for example, upon living matter is absolutely different from the effect they produce upon matter which does not possess Vitality. The forces which give rise to Chemical Affinity are wholly unknown. And so are those which give rise to the peculiar phenomena of living matter. The rays which are called Chemical may have no other part in the result than that of setting free the molecules to be acted upon by the distinct and separate forces which are the real sources of Chemical Affinity.

What, then, have we gained when we have grouped together, under one common definition, such a variety of movements and such a variety of corresponding effects? This is not the kind of unity which we see and feel in the vast system of adjustments between the Sun, the medium conveying its vibrations and the effect of these on all the phenomena of Earth. The kind of unity which is impressed upon us is neither that of a mere unity of material nor of identity in the forms of motion. On the contrary, this kind of unity among things so diverse in all other aspects is a bare intellectual apprehension, only reached as the result of difficult research, and standing in no natural connection with our ordinary apprehension of physical truth. For our conception of the Energies with which we have to deal in Nature must be moulded on our knowledge of what they do, far more than on any abstract definition of what they are; or rather, perhaps, it would be more correct to say that our conception of what things are can only be complete in proportion as we take into our view the effects which they produce upon other things around them, and especially upon ourselves, through the Organs by which we are in contact with the external world. If in these effects any two agencies are not the same—if they are not even alike—if, perhaps, they are the very antithesis of each other—then the classification which identifies them, however correct it may be, as far as it goes, must omit some characteristics which are much more essen-

tial than those which it includes. The most hideous discords which can assail the ear, and the divinest strains of the most heavenly music, can be regarded as identical in being both a series of sonorous waves. But the thought, the preparation, the concerted design—in short, the unity of Mind and of Sentiment, on which the production of musical harmony depends, and which it again conveys with matchless power of expression to other minds—all this higher unity is concealed and lost if we do not rise above the mere mechanical definition under which discords and harmonies can nevertheless be in this way correctly classed together.

And yet so pleased are we with discoveries of this kind, which reduce, under a common method of conception, things which we have been accustomed to regard as widely different, that we are apt to be filled with conceit about such definitions, as if we had reached in them some great ultimate truth on the nature of things, and as if the old aspects in which we have been accustomed to regard them were by comparison almost deceptive; whereas, in reality, the higher truth may well have been that which we have always known, and the lower truth that which we have recently discovered. The knowledge that Light and Heat are separable, that they do not always accompany each other, is a truer and juster conception of the relation in which they stand to us, and to all that we see around us, than the knowledge that they are both the same in respect of their being both "modes of motion." To know the work which a machine does is a fuller and higher knowledge than to know the nature of the materials of which its parts are composed, or even to perceive and follow the kind of movement by which its effects are produced. And if there be two machines which, in respect to structure and movement and material, are the same or closely similar, but which, nevertheless, produce totally different kinds of work, we may be sure that this difference is the most real and the most important truth respecting them. The new aspects in which we see their likeness are less full and less adequate than the old familiar aspects in which we regard them as dissimilar.

But the Mind is apt to be enamored of a new conception of this kind, and to mistake its place and its relative importance

in the sphere of knowledge. It is in this way, and in this way only, that we can account for the tendency among some scientific men to exaggerate beyond all bounds the significance of the abstract and artificial definitions which they reach by neglecting differences of work, of function, and of result, and by fixing their attention mainly on some newly discovered likeness in respect to form, or motion, or chemical composition. It is thus that because a particular substance called "Protoplasm" is found to be present in all living Organisms, an endeavor follows to get rid of Life as a separate conception, and to reduce it to the physical property of this material. The fallacy involved in this endeavor needs no other exposure than the fact that, as the appearance and the composition of this material is the same whether it be dead or living, the Protoplasm of which such transcendental properties are affirmed has always to be described as "living" Protoplasm. But no light can be thrown upon the facts by telling us that Life is a property of that which lives. The expression for this substance which has been invented by Professor Huxley is a better one—the "Physical Basis of Life." It is better because it does not suggest the idea that Life is a mere physical property of the substance. But it is, after all, a metaphor which does not give an adequate idea of the conceptions suggested by the facts. The word "basis" has a distinct reference to a mechanical support, or to the principal substance in a chemical combination. But at the best there is only a distant and metaphorical analogy between these conceptions and the conceptions which are suggested by the connection between Protoplasm and Life. We cannot suppose Life to be a substance supported by another. Neither can we suppose it to be like a chemical element in combination with another. It seems rather like a Force of Energy which first works up the inorganic materials into the form of Protoplasm, and then continues to exert itself through that combination when achieved.

We call this kind of energy by a special name, Life, for the best of all reasons, that it has special effects different from all others. It often happens that the philosophy expressed in some common form of speech is deep and true, whilst the objections which are made to it in the name of science are shallow and

fallacious. This is the case with all those familiar phrases and expressions which imply that Life and its phenomena are so distinguishable from other things that they must be spoken of by themselves. The objection made by a well-known writer,* that we might as well speak of "a watch force" as of a "vital force," is an objection which has no validity, and is chargeable with the great vice of confounding one of the clearest distinctions which exist in Nature. The rule which should govern language is very plain. Every phenomenon or group of phenomena which is clearly separate from all others, should have a name as separate and distinctive as itself. The absurdity of speaking of a "watch force" lies in this—that the force by which a watch goes is not separable from the force by which many other mechanical movements are effected. It is a force which is otherwise well known, and can be fully expressed in other and more definite terms. That force is simply the elasticity of a coiled spring. But the phenomena of Life are not due to any force which can be fully and definitely expressed in other terms. It is not purely chemical, nor purely mechanical, nor purely electrical, nor reducible to any other more simple and elementary conception. The popular use, therefore, which keeps up separate words and phrases by which to describe and designate the distinctive phenomena of Life, is a use which is correct and thoroughly expressive of the truth. There is nothing more common and nothing more fallacious in philosophy than the endeavor, by mere tricks of language, to suppress and keep out of sight the distinctions which Nature proclaims with a loud voice.

It is thus, also, that because certain creatures which, when adult, are widely separate in the scale of Being, may be traced back to some embryonic stage, in which they are undistinguishable, it has become fashionable to sink the vast differences which must lie behind this uniformity of aspect and of material composition under some vague form of words in which the mind makes, as it were, a covenant with itself not to think of such differences as are latent and invisible, however important we know them to be by the differences of result to which they lead. Thus it is common now to speak of things widely separated in

* Mr. G. H. Lewes.

rank and function as being "the same," only "differentiated," or "variously conditioned." In these, and in all similar cases, the differences which are unseen, or which, if seen, are set aside, are often of infinitely greater importance than the similarities which are selected as the characteristics chiefly worthy of regard. If, for example, in the albumen of an egg there be no discernible differences either of structure or of chemical composition, but if, nevertheless, by the mere application of a little heat, part of it is "differentiated" into blood, another part of it into flesh, another part of it into bones, another part of it into feathers, and the whole into one perfect Organic Structure, it is clear that any purely chemical definition of this albumen, or any purely mechanical definition of it, would not merely fail of being complete, but would absolutely pass by and pass over the one essential characteristic of Vitality which makes it what it is, and determines what it is to be in the System of Nature.

Let us always remember that the more perfect may be the apparent identity between two things which afterwards become widely different, the greater must be the power and value of those invisible distinctions—of those unseen factors—which determine the subsequent divergence. These distinctions are invisible, not merely because our methods of analysis are too coarse to detect them, but because apparently they are of a nature which no physical dissection and no chemical analysis could possibly reveal. Some scientific men are fond of speaking and thinking of these invisible factors as distinctions due to differences in "molecular arrangement," as if the more secret agencies of Nature gave us the idea of depending on nothing else than mechanical arrangement—on differences in the shape or in the position of the molecules of Matter. But this is by no means true. No doubt there are such differences—as far beyond the reach of the microscope as the differences which the microscope does reveal are beyond the reach of our unaided vision. But we know enough of the different agencies which must lie hid in things apparently the same, to be sure that the divergences of work which these agencies produce do not depend upon or consist in mere differences of mechanical arrangement. We know enough of those agencies to be sure that they

are agencies which do, indeed, determine both arrangement and composition, but do not themselves consist in either.

This is the conclusion to which we are brought by facts which are well known. There are some simple structures in Nature which can be seen in the process of construction. There are conditions of matter in which its particles can be seen rushing under the impulse of invisible forces to take their appointed place in the Form which to them is a Law. Such are the facts visible in the processes of Crystallization. In them we can see the particles of matter passing from one "molecular condition" to another; and it is impossible that this passage can be ascribed either to the old arrangement which is broken up, or to the new arrangement which is substituted in its stead. Both structures have been built up out of elementary materials by some constructive agency which is the master and not the servant—the cause and not the consequence of the movements which are effected, and of the arrangement which is their result. And if this be true of crystalline forms in the mineral kingdom, much more is it true of Organic forms in the animal kingdom. Crystals are, as it were, the beginnings of Nature's architecture, her lowest and simplest forms of building. But the most complex crystalline forms which exist—and many of them are singularly complex and beautiful—are simplicity itself compared with the very lowest Organism which is endowed with Life. In the wonderful processes by which bone is formed, the foundations or the moulds of the structure are first laid down in cartilage or gristle. This is a compound substance purely Organic, whereas bone is a substance in which the mineral element Calcium or lime is imported into the structure for the purpose of giving it solidity. The movements and changes under which this importation of what may be called comparatively foreign material is effected, have been watched and described. They are changes and movements in the cartilage,—that is to say, in the form and arrangement of the mould, which are suggestive of almost conscious anticipation. The mould can be seen in the process of being moulded. "The cells of the cartilage, with their cell-spaces, become larger—flatten out—and usually show a tendency to arrange themselves in parallel rows; between

which, if the change has already been in progress for some time, the lines of calcification may be seen advancing." *

This is only one example out of thousands in which similar processes have been observed. In all living Organisms, therefore, still more than in the formation of Crystals, the work of "differentiation"—that is to say, the work of forming out of one material different structures for the discharge of different functions—is the work of agencies which are invisible and unknown; and it is in these agencies, not in the molecular arrangements which they cause, that the essential character and individuality of every Organism consists. Accordingly, in the development of seeds and of eggs, which are the germs of plants and animals respectively, the particles of matter can be traced moving, in obedience to forces which are unseen, from "molecular conditions" which appear to be those of almost complete homogeneity to other molecular conditions which are of inconceivable complexity. In that mystery of all mysteries, of which Biologists talk so glibly, the living "nucleated Cell," the great work of Creation may be seen in actual operation, not caused by "molecular condition," but determining it, and, from elements which to all our senses, and to all our means of investigation, appear absolutely the same, building up the molecules of Protoplasm, now into a seaweed, now into a cedar of Lebanon, now into an insect, now into a fish, now into a reptile, now into a bird, now into a Man. And in proportion as the molecules of matter do not even seem to be the masters but the servants here, so do the forces which dispose of them stand out separate and supreme. In every germ this development can only be "after its kind." The molecules must obey; but no mere wayward or capricious order can be given to them. The formative energies seem to be as much under command as the materials upon which they work. For, invisible, intangible, and imponderable as these forces are—unknown and even inconceivable as they must be in their ultimate nature—enough can be traced of their working to assure us that they are all closely related to each other, and belong to a System which is one. Out of the chemical elements of Nature, in nu-

* "On the Ossification of the Terminal Phalanges of the Digits," by F. A. Dixey, B.A., Oxon. Proceed. Ro. Soc., Vol. XXXI., No. 207.

merous but definite combinations, it is the special function of Vegetable Life to lay the foundations of Organic Mechanism; whilst it is the special function of Animal Life to take in the materials thus supplied, and to build them up into the highest and most complicated structures. This involves a vast cycle of operations, as to the unity of which we cannot be mistaken —for it is a cycle of operations obviously depending on adjustments among all the forces both of solar and terrestrial physics —and every part of this vast series of adjustments must be in continuous and unbroken correlation with the rest.

Thus every step in the progress of science which tends to reduce all Organisms to one and the same set of elementary substances, or to one and the same initial structure, only adds to the certainty with which we conclude that it is upon something else than composition, and upon something else than structure, that those vast differences ultimately depend which separate so widely between living things in rank, in function, and in power. And although we cannot tell what that something is—although science does not as yet even tend to explain what the directive agencies are or how they work—one thing, at least, is plain: that if a very few elementary substances can enter into an untold variety of combinations, and by virtue of this variety can be made to play a vast variety of parts, this result can only be attained by a system of mutual adjustments as immense as the variety it produces, as minute as the differences on which it depends, and as centralized in direction as the order and harmony of its results. And so we come to understand that the unity which we see in Nature is that kind of unity which the Mind recognizes as the result of operations similar to its own,—not a unity which consists in mere sameness of material, or in mere identity of composition, or in mere uniformity of structure, but a unity which consists in the subordination of all these to similar aims and to similar principles of action—that is to say, in like methods of yoking a few elementary forces to the discharge of special functions, and to the production, by adjustment, of one harmonious Whole.

And of this Unity, we who see it, and think of it, and speak of it—we are part. In Body and in Mind we belong to it, and are included in it. It is more easy to admit this as a general

proposition than really to see it as a truth and to accept all the consequences it involves. The habitual attitude of our thoughts is certainly not in accordance with it. We look on "Nature" as something outside of us—something on which we can look down, or to which we can look up, according to our mood; but in any case, something in which we are exceptions, and which we can and ought to regard from an external point of view. It may be well, therefore, to consider a little more carefully "Man's place in Nature"—his share and position in that unity which he sees and feels around him.

CHAPTER II.

MAN'S PLACE IN THE UNITY OF NATURE.

MAN is included in the Unity of Nature, in the first place, as regards the composition of his Body. Out of the ordinary elements of the material world is that Body made, and into those elements it is resolved again. With all its beauties of form and of expression, with all its marvels of structure and of function, there is nothing whatever in it except some few of the elementary substances which are common in the atmosphere and the soil. The three commonest gases, oxygen, hydrogen, and nitrogen, with carbon and with sulphur, are the foundation stones. In slightly different proportions, these elements constitute the primordial combination of matter which is the abode of Life. In the finished structure there appear, besides, lime, potash, and a little iron, sodium, and phosphorus. These are the constituents of the human Body—of these in different combinations —and, so far as we know, of nothing else. The same general composition, with here and there an ingredient less or more, prevails throughout the whole animal and vegetable world, and its elements are the commonest in the Inorganic Kingdom also.

This may seem a rude, and it is certainly a rudimentary view of the relation which prevails between ourselves and the world around us. And yet it is the foundation, or at least one of the foundations, on which all other relations depend. It is because of the composition of our Body, that the animals and plants around us are capable of ministering to our support—that the common air is to us the very breath of life, and that herbs and minerals in abundance have either poisoning properties or healing virtue. For both of these effects are alike the evidence of some relation to the Organism they affect; and both are in different degrees so prevalent and pervading, that of very few things indeed can it be said that they are wholly

inert upon us. Yet there is no substance of the thousands which in one manner or another affect the Body, which does not so affect it by virtue of some relation which it bears to the elements of which that Body is composed, or to the combinations into which those elements have been cast.

And here we ascend one step higher among the facts which include Man within the Unity of Nature. For he is united with the world in which he moves, not only by the elements of which his Body is composed, but also by the methods in which those elements are combined—the forces by which they are held together, and the principles of construction according to which they are built up into separate Organs for the discharge of separate functions. Science has cast no light on the ultimate nature of Life. But whatever it be, it has evidently fundamental elements which are the same throughout the whole circle of the Organic world; the same in their relations to the Inorganic; the same in the powers by which are carried on the great functions of nutrition, of growth, of respiration, and reproduction. There are, indeed, infinitely varied modifications in the mechanism of the same Organs to accommodate them to innumerably different modes by which different animals obtain their food, their oxygen, and their means of movement. Yet so evident is the unity which prevails throughout, that Physiologists are compelled to recognize the fundamental facts of Organic Life as "the same, from the lowest animal inhabiting a stagnant pool up to the glorious mechanism of the human form." *

This language is not the expression of mere poetic fancy, nor is it founded on dim and vague analogies. It is founded on the most definite facts which can be ascertained of the ultimate phenomena of Organic Life, and it expresses the clearest conceptions that can be formed of its essential properties. The creature which naturalists call the Amœba, one of the lowest in the animal series, consists of nothing but an apparently simple and formless jelly. But simple and formless as it appears to be, this jelly exhibits all the wonder and mystery of that power which we know as Life. It is in virtue of that power

* On the Nervous System, by Alex. Shaw. Appendix to Sir Charles Bell's "Anatomy of Expression."

that the dead or inorganic elements of which it is composed are held together in a special and delicate combination, which no other power can preserve in union, and which begins to dissolve the moment that power departs. And as in virtue of this power the constituent elements are held in a peculiar relation to each other, so in virtue of the same power does the combination possess peculiar relations with external things. It has the faculty of appropriating foreign substances into its own, making them subservient to the renewal of its own material, to the maintenance of its own energy, and to the preservation of its own separate individuality. It has the faculty, moreover, of giving off parts of itself, endowed with the same properties, to lead a separate existence. This same substance, which when analyzed has always the same chemical composition, and when alive has always the same fundamental properties, is at the root of every Organism, whether animal or vegetable. Out of its material all visible structure is built up, and the power which holds its elements together is the same power which performs the further work of moulding them into tissues—first forming them and then feeding them, and then keeping them in life. This is as true of the highest Organism of Man as it is of the lowest, in which visible structure begins to be. The phenomena of disease have convinced Physiologists that all the tissues of the body are freely penetrated by the protoplasmic corpuscles of the blood, and that the primordial properties displayed in the substance of an Amœba, which has no distinguishable parts and no separate organs, afford the only key to the fundamental properties of every animal body. One eminent observer assigns so high a place to this protoplasmic matter as the primary physical agent in the building of the House of Life, and in its renovation and repair, that he considers all its other materials, and all its completed structures, as comparatively "dead."

But the unity of Man's body with the rest of Nature lies deeper still than this. The same elements and the same primary compounds are but the foundations from which the higher unities arise. These higher unities appear to depend upon and to be explained by this—that there are certain things which *must be done* for the support of Animal Life, and these things

are fundamentally the same from the lowest to the highest creatures. It is for the doing of these things that "Organs" are required, and it is in response to this requirement that they are provided. Food—that is to say, foreign material—must be taken in, and it must be assimilated. The circulating fluids of the body must have vessels in which to circulate, and through the walls of these they must be allowed to absorb oxygen; and when this cannot be done more simply, a special apparatus must be provided for the separation of this essential element of life from the air or from the water. Sensation must be localized and adapted to the perception of movements in surrounding media. The tremors of the atmosphere and of the luminiferous medium must first be caught upon responsive—that is to say, upon adapted—surfaces, and then they must be translated into the language of Sensation—that is to say, into sight and hearing. The heat evolved in the chemical processes of digestion and of oxygenation of the blood must be made convertible into other forms of motion. The forces thus concentrated must be stored, rendered accessible to the Will, and distributed to members which are at its command. These and many other uniform necessities of the animal frame constitute a unity of function in Organs of the widest dissimilarity of form, so that however different they may be in shape, or in structure, or in position, they are all obviously reducible to one common interpretation. They do the same things—they serve the same purposes—they secure the same ends—or, to use the language of physiology, they discharge the same functions in the animal economy.

But more than this: even the differences of form steadily diminish as we ascend in the scale of Being. Not only are the same functions discharged, but they are discharged by Organs of the same general shape, formed on one pattern and occupying an identical position in one plan of structure. It is on this fact that the science of Comparative Anatomy is founded, and the well-established doctrine of "homologies." The homology of two Organs in two separate animals is nothing but the unity of place which they occupy in a structure which is recognized as one and the same in a vast variety of creatures—a structure which is one in its general conception, and one in the relative

arrangement of its parts. In this clear and very definite sense, the body of Man, as a whole, is one in structure with the bodies of all vertebrate animals; and as we rise from the lowest of these to him who is the highest, we see that same structure elaborated into closer and closer likeness, until every part corresponds—bone to bone, tissue to tissue, organ to organ.

It is round this fact that so many disputants are now fighting. But all the controversy arises not as to the existence of the fact, but as to its physical cause. The fact is beyond question. In a former work * I have dwelt at some length on the bearing of this fact on our conceptions of "Creation by Law," and on the various theories which assume that such close relationship in Organic Structure can be due to no other cause than blood-relationship through ordinary generation. At present I am only concerned with the fact of unity, whatever may be the physical cause from which that unity has arisen. The significance of it, as establishing Man's place in the Unity of Nature, is altogether independent of any conclusion which may be reached as to those processes of creation by which his body has been fashioned on a plan which is common to him and to so many animals beneath him. Whether Man has been separately created out of the inorganic elements of which his body is composed, or whether it was born of matter previously organized in lower forms, this community of structure must equally indicate a corresponding community of relations with external things, and some antecedent necessity deeply seated in the very nature of those things, why his bodily frame should be like to theirs.

And, indeed, when we consider the matter, it is sufficiently apparent that the relationship of Man's body to the bodies of the lower animals is only a subordinate part and consequence of that higher and more general relationship which prevails between all living things and those elementary Forces of Nature which play in them, and around them, and upon them. If we could only know what that relationship is in its real nature and in its full extent, we should know one of the most inscrutable of all secrets. For that secret is no other than the ultimate nature of Life. The great object is to keep the little knowledge of it which we possess safe from the confusing effect of decep-

* "The Reign of Law."

tive definitions. The real unities of Nature will never be reached by confounding her distinctions. For certain purposes it may be a legitimate attempt to reduce the definition of Life to its lowest terms—that is to say, it may be legitimate to fix our attention exclusively on those characteristics which are common to Life in its lowest and in its highest forms, and to set aside all other characteristics in which they differ. It may be useful sometimes to look at Life under the terms of such a definition, in order, for example, the better to conceive some of its relations with other things. But in doing so we must take care not to drop out of the terms so defining Life anything really essential to the very idea of it. Artificial definitions of this kind are dangerous experiments in philosophy. It is very easy by mere artifices of language to obliterate the most absolute distinctions which exist in Nature. Between the living and the non-living there is a great gulf fixed, and the indissoluble connection which somehow, nevertheless, we know to exist between them, is a connection which does not fill up that gulf, but is kept up by some bridge being, as it were, artificially built across it. This unity, like the other unities of Nature, is not a unity consisting of mere continuity of substance. It is not founded upon sameness, but, on the contrary, rather upon difference, and even upon antagonisms. Only, the forces which are thus different and opposed are subordinate to a system of adaptation and adjustment.

Nor must we fail to notice the kind of unity which is implied in the very words "adaptation" and "adjustment"—and, above all others, in the special adjustments connected with Organic Life. There are many unions which do not involve the idea of adjustment, or which involve it only in the most rudimentary form. The mere chemical union, for example, of two or more elements—unless under special conditions—is not properly an adjustment. We should not naturally call the formation of rust an adjustment between the oxygen of the atmosphere and metallic iron. When the combinations effected by the play of chemical affinities are brought about by the selection of elements so placed within reach of each other's reactions as to result in a given product then that product would be accurately described as the result of co-ordination.

and adjustment. But the kind of co-ordination and adjustment which appear in the facts of Life is of a still higher and more complicated kind than this. Whatever the relationship may be between living Organisms and the elements, or elementary forces of external Nature, it certainly is not the relationship of mere chemical affinities. On the contrary, the unions which these affinities by themselves produce can only be reached through the dissolution and destruction of living bodies. The subjugation of chemical forces under some higher form of energy which works them for the continued maintenance of a separate individuality—this is of the very essence of Life. The destruction of that separateness or individuality is of the very essence of Death. It is not Life, but the cessation of Life, which, in this sense and after this manner, effects a chemical union of the elements of the body with the same and with other elements around it. There is indeed an adjustment—a close and intricate adjustment—between the chemical affinities of these elements as they are combined in the living body; but it is an adjustment of them under the controlling energy of a power which cannot be identified with any other, and which always presents phenomena peculiar to itself. Under that power we see that the laws and forces of Chemical Affinity, as exhibited apart from Life, are held, as it were, to service—compelled, indeed, to minister, but not allowed to rule. Through an infinite variety of Organisms, this mysterious subordination is maintained, ministering through an ascending series to higher and higher grades of sensation, perception, consciousness, and thought.

And here we come in sight of the highest adjustment of all. Sensation, perception, consciousness, and thought,—these, if they be not the very essence of Life, are at least—in their order—its highest accompaniments and result. They are the ultimate facts, they are the final realities, to which all lesser adjustments are themselves adjusted. For, as the elementary substances and the elementary Forces of Nature which are used in the building of the body are there held by the energies of Life under a special and peculiar relation to those same elements and to those same *forces* outside the body, so also are they held in peculiar *relations to* those characteristic powers in which we are compelled

to recognize the rudimentary faculties of Mind. Sensation is the first of these, and if it be the lowest, it is at least the indispensable basis of all the rest. As such, it cannot be studied too attentively in the first stages of its appearance, if we desire to understand the unity of which it is the index and result. We have seen that the mechanism of living bodies is one throughout the whole range of Animal Life—one in its general plan, and one even in the arrangement of many of its details. We have seen, too, that this unity rests upon that other—in virtue of which all Organisms depend for the maintenance of their life, upon adjustments to certain physical laws which are held, as it were, in vassalage, and compelled to service; doing in that service what they never do alone, and not doing in that service what they always do when freed from it.

And now we have to ask what that service is? We can only say that it is the service of Life in all its manifestations, from those which we see in the lowest creatures up to the highest of which, in addition, we are conscious in ourselves. I say "in addition"—because this is the fundamental lesson of Physiology and of Comparative Anatomy—that the principle and the mechanism of sensation are the same in all creatures, at least in all which have the rudiments of a nervous system. This identity of principle and of structure in the machinery of Sensation, taken together with the identity of the outward manifestations which accompany and indicate its presence in animals, makes it certain that in itself it is everywhere the same. This does not mean, of course—very far from it—that the range of pleasure or of pain consequent on sensation—still less the range of intelligent perception—is the same throughout the Animal Kingdom. The range of pleasure or of pain, and still more the range of intelligent perception, depends on the association of higher faculties with mere sensations, and upon other peculiarities or conditions of Organization. We all know by our own experience when comparing ourselves with ourselves in different states of health or of disease, and by observing the like facts in others, that the degree of pleasure or of suffering, of emotion or of intellectual activity, which is connected with sensation, may be almost infinitely various according to various conditions of the body. But this does not affect the general

proposition that Sensation is in itself one thing throughout the Animal Kingdom. It cannot be defined in language, because all language is founded on it, assumes it to be known, and uses the metaphors it supplies for the expression of our highest intellectual conceptions. But though it cannot be defined, this at least we can say concerning it, that Sensation is the characteristic property of Animal Life; that it is an affection of the "Anima" of that which distinguishes animate from inanimate things, and that as such it constitutes one of the most essential of the fundamental properties of Mind.

So true is this, that the very word "Idea" which has played a memorable part in the history of speculation, and which in common speech has now come to be generally associated with the highest intellectual abstractions, has had in modern philosophy no other definite meaning than the impressions or mental images received through the senses. This is the meaning attached to it (although, perhaps, no writer has ever adhered to it with perfect consistency) in the writings of Descartes, of Locke, and of Bishop Berkeley; and it is well worthy of remark that the most extreme doctrine of Idealism, which denies the reality of Matter, and, indeed, the reality of everything except Mind, is a doctrine which may be as logically founded upon sensation in a Zoophyte as upon sensation in a Man. The famous proposition of Bishop Berkeley, which he considers as almost self-evidently true, "that the various sensations, or ideas imprinted on the sense, cannot exist otherwise than in the Mind perceiving them," is a proposition clearly applicable to all forms of sensation whatever. For every sensation of an Organism is equally in the nature of an "Idea" in being an affection of the living principle, which alone is susceptible of such affections; and it is plainly impossible to conceive any sense-impression whatever as existing outside a living and perceiving creature.

We are now, indeed, so accustomed to attach the word "Idea" to the highest exercises of Mind, and to confine the word "Mind" itself to some of its higher manifestations, that it may startle some men to be told that sensation is in itself a mental affection. We have, however, only to consider for a *moment* how inseparably connected sensation is with appetite

and with perception, to be convinced that in the phenomena of sensation we have the first raw materials and the first small beginnings of Intelligence and of Will. It is this fundamental character of sensation which explains and justifies the assertion of Philosophers—an assertion which at first sight appears to be a mere paradox—that the "Ideas" we receive through the senses have no "likeness" to the objects they represent. For that assertion, after all, means nothing more than this—that the impressions made by external things upon living Beings through the senses, are in themselves mental impressions, and as such cannot be conceived as like in their own nature to inanimate and external objects. It is the mental quality of all sensation, considered in itself, which is really affirmed in this denial of likeness between the affections of sense and the things which produce those affections in us. It is one of the many forms in which we are compelled to recognize the inconceivableness of any sort of resemblance between Mind and Matter, between external things and our own perceptive powers.

And yet it is across this great gulf of difference—apparently so broad and so profound—that the highest Unity of Nature is nevertheless established. Matter built up and woven into "Organs" under the powers of Life is the strong foundation on which this unity is established. It is the unity which exists between the living Organism and the elements around it which renders that Organism the appropriate channel of mental communication with the external world, and a faithful interpreter of its signs. And this the Organism is—not only by virtue of its substance and composition, but also and especially by virtue of its adjusted structures. All the organs of sense discharge their functions in virtue of a purely mechanical adjustment between the structure of the Organ and the particular form of external force which it is intended to receive and to transmit. How fine those adjustments are can best be understood when we remember that the retina of the eye is a machine which measures and distinguishes between vibrations which are now known to differ from each other by only a few millionths of an inch. Yet this amount of difference is recorded and made instantly appreciable in the sensations of color by the adjusted

mechanism of the eye. Another adjustment, precisely the same in principle, between the vibrations of Sound and the structure of the ear, enables those vibrations to be similarly distinguished in another special form of the manifold language of sensation. And so of all the other organs of sense—they all perform their work in virtue of that purely mechanical adjustment which places them in a given relation to certain selected manifestations of external force, and these they faithfully transmit, according to a code of signals, the nature of which is one of the primary mysteries of Life, but the truthfulness of which is at the same time one of the most certain of its facts.

For it is upon this truthfulness—that is to say, upon a close and efficient correspondence between the impressions of Sense and certain corresponding realities of external Nature—that the success of every Organism depends in the battle of life. And all Life involves a battle. It comes indeed to each animal without effort of its own, but it cannot be maintained without individual exertion. That exertion may be of the simplest kind, nothing more than the rhythmic action of a muscle contracting and expanding so as to receive into a sac such substances as currents of water may bring along with them; or it may be the more complex action required to make or induce the very currents which are to bring the food; or it may be the much more complex exertions required in all active locomotion for the pursuit and capture of prey: all these forms of exertion exist, and are all required in endless variety in the animal world. And throughout the whole of this vast series the very life of every creature depends on the unity which exists between its sense-impressions and those realities of the external world which are specially related to them. There is therefore no conception of the Mind which rests on a broader basis of experience than that which affirms this unity—a unity which constitutes and guarantees the various senses with their corresponding appetites, each in its own sphere of adapted relations, to be exact and faithful interpreters of external truth.

A still more wonderful and striking proof is obtained of the Unity of Nature, and a still more instructive light is cast upon the depth of its source and character, when we observe how

far-reaching these interpretations of sense are even in the very lowest creatures: how they are true not only in the immediate impressions they convey, but true also as the index of truths which lie behind and beyond—of truths, that is to say, which are not expressly included—not directly represented—in either sensation or perception. This, indeed, is one main function and use, and one universal characteristic, of all sense-impressions, that over and above the pleasure they give to sentient creatures, they lead and guide to acts required by natural laws which are not themselves objects of sensation at all, and which therefore the creatures conforming to them cannot possibly either see or comprehend. It is thus that the appetite of hunger and the sense of taste, which in some form or other, however low, is perhaps the most universal sensation of animal Organisms, is true not only as a guide to the substances which do actually gratify the sense concerned, but true also in its unseen and unfelt relations with those demands or laws of force which render the assimilation of new material an indispensable necessity in the maintenance of Animal Life. Throughout the whole Kingdom of Nature this law prevails. Sense-perceptions are in all animals indissolubly united with instantaneous impulses to action. This action is always directed to external beings. It finds in these things the satisfaction of whatever desire is immediately concerned, and beyond this it ministers to ends of which the animal knows nothing, but which are of the highest importance both in its own economy and in the general economy of Nature.

The wonderful instincts of the lower animals—the precision and perfection of their work—are a glorious example of this far-reaching adjustment between the perceptions of sense and the laws which prevail in the external world. Narrow as the sphere of those perceptions may be, yet within that sphere they are almost absolutely true. And although the sphere is indeed narrow as regards the very low and limited Intelligence with which it is associated in the animals themselves, it is a sphere which beyond the scope of their Intelligence can be seen to place them in unconscious relation with endless vistas of co-ordinated action. The sentient actions of the lower animals involve not merely the rudimentary power of perceiving the differ-

ences which distinguish things, but the much higher power of profiting by those relations between things which are the foundation of all voluntary agency, and which place in the possession of living creatures the power of attaining ends through the employment of appropriate means. The direct and intuitive perception of things which stand in the relation of means to ends, though it may be entirely dissociated from any conscious recognition of this relation in itself—that is to say, the direct and intuitive perception of the necessity of doing one thing in order to attain to another thing—is in itself one of the very highest among the pre-adjusted harmonies of Nature. For it must be remembered that those relations between things which render them capable of being used as means to ends, are relations which never can be the direct objects of Sensation, and therefore the power of acting upon them is an intuition of something which is out of sight. It is a kind of dim seeing of that which is invisible. And even if it be separated entirely in the lower animals—as it almost certainly is—from anything comparable with our own prescient and reasoning powers, it does not the less involve in them a true and close relation between their instincts and the Order of Nature with its laws.

The spinning machinery which is provided in the body of a Spider is not more accurately adjusted to the viscid secretion which is provided for it, than the instinct of the Spider is adjusted both to the construction of its web and also to the selection of likely places for the capture of its prey. Those birds and insects whose young are hatched by the heat of fermentation have an intuitive impulse to select the proper materials, and to gather them for the purpose. All creatures, guided sometimes apparently by senses of which we know nothing, are under like impulses to provide effectually for the nourishing of their young. It is, moreover, most curious and instructive to observe that the extent of prevision which is involved in this process, and in the securing of the result, seems very often to be greater as we descend in the scale of Nature, and in proportion as the parents are dissociated from the actual feeding or personal care of their young. The Mammalia have nothing to provide except food for themselves, and have at first, and for a long time, no duty to perform beyond the discharge of a purely physical function.

Milk is secreted in them by a purely unconscious process, and the young need no instruction in the art of sucking. Birds have much more to do—in the building of nests, in the choice of sites for these, and after incubation, in the choice of food adapted to the period of growth. Insects, much lower in the scale of Organization, have to provide very often for a much more distant future, and for various stages of development not only in their own young but in the *nidus* which surrounds them.

There is one group of insects, well known to every observer—the common Gall-flies—which have the power of calling on the vegetable world to do for them the work of nest-building; and in reponse to the means with which these insects are provided, the Oak, or the Willow, or the Rose, does actually lend its power of growth to provide a special *nidus* by which the plant protects the young insect as carefully as it protects its own seed. I shall dwell on this example for a moment, because it is not easy to exhaust the wonders which are involved in this cycle of operations. For it is to be observed that they are not operations conducted according to the ordinary laws of Nature. It is indeed according to that ordinary course that vegetable Organisms should pour out their juices when they are wounded. It is an incident of their lower organization, and lower rank in the scale of life, that they can bleed more copiously from such wounds without fatal injury than it would be possible for animals to bleed. But the flow of the juices under such circumstances is as it were a heedless flow—vacant of any purpose or intention—discharging no function in the vegetable economy or in the economy of external Nature. Least of all has it any regard to life other than its own. If any insect be involved in that flow, the consequences to it are instant death. Its legs and wings are clogged, its respiratory orifices are filled up, and every function of its body is stopped forever. It is thus that some of the insects of a former age in the world's history have been preserved to us by the exudations of some unknown species of Pine, whose hardened gum is known to us as Amber. It is also according to the ordinary course of Nature that foreign substances introduced into the growing tissues of a plant should be surrounded by those tissues and involved in them. But here also the involvement is purely mechanical, and the grip with which

the intruding substance is seized and held, is a grip blind and ruthless. Bands of the strongest iron are often thus involved, and are burst asunder like green withes by the slow but tremendous energies of vegetable growth. The woody fibre, too, which surrounds such substances, is very apt to be the hardest and toughest of all, and this is almost invariably the case with the growths which arise from injury or disease, with the wens and excrescences on the bark and stems of trees.

It is therefore in absolute difference and contradistinction from all these natural laws, that the Oak, for example, is made to provide out of its own substance a wonderful nest for the egg and larva of the Gall-fly. If we examine one form of these nests, for example, that of the Marble Gall (which is the nest of the species known to entomologists as the *Cynips Kolleri*), we shall find that there has been formed on the branch or twig of the Oak a globular body of the most curious and complex structure. Externally, it has a skin which imitates the natural bark. Internally, it consists of a pithy tissue which is wholly unlike any of the tissues produced by the Oak under its natural conditions. It is a radiating tissue, and yet it does not radiate from the point which is its apparent point of growth or of attachment to the stalk. It radiates from its own centre,—or rather from a little cell or chamber which occupies that centre. This cell or chamber is internally quite smooth, has a thin wall of hardened material, and is of the exact size and capacity which will admit of the insect larva being coiled up comfortably within it, and of attaining there a certain definite degree of development or of growth. Outside the thin wall of this cell or chamber, and between it and the external bark, the whole sphere is filled with a substance which may be described as a granular pith which radiates in all directions from the cell to the circumference. If one of these Galls be cut or broken open in the autumn when it is becoming ripe, and if the cut be made so as to expose the whole in section, one of the most curious sights in Nature is exposed to view. The grub is seen folded in its pregnant rest. The mysterious changes which are going on in its body are indeed invisible. And so also are the equally mysterious processes by which that body came to be there at all, and to be provided with such a home. These processes are wholly different in kind from

all others in Nature. Among birds, the embryo chick is hatched within a shell which has indeed a wonderful structure and many curious properties. But that shell is constructed in the ovary of the mother-bird, and out of calcareous material which that mother has taken in as food. The Dormouse builds the nest in which itself hybernates. It is a wonderful structure, built from the inside outwards, suspended also by the inmate, before it closes the final aperture, upon the bough of some sheltered thicket, and so warmly spun that neither the rains nor cold of winter can pierce the texture and chill the sleeper. But in this case the animal has the mechanical weapons by which the material can be cut and can be woven. The Caterpillar also spins its own cocoon; but here also the spinning machinery is given to the creature, and the secretions of its own body are sufficient to provide the threads, which, when farther woven, are the richest and costliest of human garments. But there is no similar explanation of this strange abode of the larva of the Gall-fly. It has no means of making the nest in which it lies: the material does not come from its own body, nor from the bodies of its parents. Neither is that material even woven or built or fashioned by the one or by the other. Across a great gap and gulf in Nature—even that which separates a highly-organized plant from a highly-organized insect—this strange unity of co-operation has been effected. The Oak has yielded up its juices to protect a stranger: they overflow it without venturing to involve it,—circling round it and bending over it,—as if in awe before a Life which is higher than their own. If it be true that Solomon in all his glory was not arrayed like a flower, it is equally true that neither Solomon when an infant, nor any child of Man, has ever been cradled as this insect is. All the richest products of Nature and of art are sometimes lavished on the little bed which is to hold a human infant. For these purposes, and for a thousand others like to these, Nature yields to Man her dead products, but she never yields her living powers. Yet for the nurture and protection of this poor maggot, the most secret of these powers are held to labor. The forces of vegetable growth work for it as they never work even for their own natural organs. They secrete for it a peculiar substance; they mould it into a peculiar form; they hang it out in the light and air as if it were their own

fruit; they even exhaust themselves in its service, and their own flowers and leaves are often cankered in its support.

All this is an exception to ordinary laws: a break, as it might almost seem, in the Unity and in the Continuity of Nature. And so in a sense it is. It is no natural function of the Oak or of the Rose to produce these Galls. They are in one sense of the word unnatural, and in the truest sense of the word highly artificial. But this is the very character which reveals their place in the Unity of Nature by revealing them in connection with a higher circle of laws than those in ordinary operation. Under these higher laws, the mere physical and vital forces are seen to be as clay in the hands of the Potter. Their subordination may be hidden sometimes, at least to our blind eyes, under the Uniformities of Nature: but it becomes, as it were, almost tangible and visible when these Uniformities are so strangely broken. And yet in what may be called this distortion of Vegetable vitality to purposes which are in a sense unnatural, there is no breach in the great mental law which demands the special adaptation of means to ends. This adaptation is revealed when we examine the structure of the mother Gall-fly. It then becomes at once apparent that the Gall is produced by the operation of an elaborate apparatus. This apparatus is so elaborate and so complicated that the most eminent Entomologists have been exercised upon its mechanism since the days of Reaumur, without being able fully to explain or understand it. The general principle, indeed, or idea of the apparatus appears to be ascertained. It is an apparatus for inserting the egg of the fly into vegetable tissue, with such effects upon that tissue, both by mechanical injury and by chemical poisoning, that the plant is stimulated and excited to abnormal action and to artificial growths. For this extraordinary purpose, and with this most mysterious and complicated result, there is elaborated in the body of the fly implements for boring, for rasping, for brushing, for irritating by mechanical means the substance of the plant. The same implements are farther made to subserve the function of inserting the egg, and along with it of inserting also some acrid animal secretion which has a specific action on the secretions of the plant. This is the sum and substance of all that is known

about it. It leaves the special mystery of the result wholly unexplained; because in no other case, and under no other guidance, can either mechanical injury or chemical poisoning produce in plants any morbid growth which is other than regardless of the interests and of the life of external Organisms. But although the method of operation is wholly inexplicable, and the general result remains as exceptional as before, yet the fact of it being done by an apparatus as special and exceptional as the result, is a fact which brings it at once within the Unity of Nature in the highest sense in which that Unity is intelligible to us. We can at least see that it is done by knowing how to do it. The great gap and gulf which lies in Organization between the Plant and the Insect is spanned and arched across by knowledge of intimate relations between them which are unknown to us, and by command over resources which bring these relations into artificial co-operation.

And then when this recognition is arrived at, other recognitions follow, which bring into closer and closer correspondence the phenomena of our own Mind, and the peculiar series of phenomena which in the case of the Gall-flies are to be observed in Nature. For just as the human Mind, when a new idea has shone upon it, reflects that idea in a variety of forms, and finds new and ever newer applications for it, so it transpires that in like manner Nature, having as it were entered upon this very special line of contrivance for the development of insect life, pursues it through every form and variety of device. Not only are there a great variety of Galls produced by different species of fly upon different species of tree, but a great variety is produced upon the same tree by the different apparatus with which different flies are armed. The bark is attacked by one species, the leaves by another; the young shoots, the parts of fructification, and even the tendrils of the roots, have, each and all, some special form of Gall-fly to whom they are compelled to yield their various powers and functions. But in every case those functions are as it were perverted from the ordinary course of Nature, and develop products unlike to any which they develop when that ordinary course is not interfered with. The Galls which hang upon the Catkins are like a bunch of grapes. The root produces a large Gall, in which are

chambers provided for a whole colony of grubs. Some Galls are prickly, some are branched, and some resemble little artichokes. Others are of the color and consistency of waxy apples. One foreign species is invaluable in the manufacture of ink, because the united chemistry of the insect and the plant have there produced an acid which Nature does not elsewhere distil.*

Now, it is to be observed of all this wonderful combination and co-operation of agencies, animal and vegetable, that the blind appetite and instinct of the creature, which impels it to set this apparatus to work in the proper place, is an instinct in which the whole knowledge and foreknowledge of these operations is hidden and implied. The perceptions of taste, or of smell, or of whatever other sense they may have, and which we have not, which determine the choice of the fly and make it select the right portion of the plant for the work of depositing its egg, are perceptions which are true for a long way beyond the immediate operation which they at once stimulate and direct. They are perceptions which stand in unbroken—though they are unseen—relations with a whole world beyond that which the creature sees, and with a distant future.

There is another example of the same wealth of meaning in animal instincts which in some points of view is even more remarkable. Bees, if we are to believe the evidence of observers, have an intuitive guidance in the selection of food, which has the power of producing organic changes in the bodies of the young, and by the administration of which, under what may be called artificial conditions, the sex of certain selected individuals can be determined, so that they may become the mothers and queens of future hives.

These are but a few examples of facts of which the whole animal world is full, presenting, as it does, one vast series of adjustments between bodily Organs and corresponding instincts. But this adjustment would be useless unless it were part of another adjustment between the instincts and perceptions of animals and those facts and forces of surrounding Nature which are related to them, and to the whole cycle of things of which they

* Westwood's Introduction to the Modern Classification of Insects, vol. ii., the Cynipidæ, *passim*.

form a part. In those instinctive actions of the lower animals which involve the most distant and the most complicated anticipations, it is clear that the prevision which is involved is a prevision which is not in the animals themselves. They appear to be guided by some simple appetite, by an odor or a taste, and they have obviously no more consciousness of the ends to be subserved, or of the mechanism by which they are secured, than the suckling has of the processes of nutrition. The path along which they walk is a path which they did not engineer. It is a path made for them, and they simply follow it. But the propensities and tastes and feelings which make them follow it, and the rightness of its direction towards the ends to be attained, do constitute a Unity of Adjustment which binds together the whole world of Life, and the whole inorganic world on which living things depend.

I have called this adjustment mechanical, and so, in the strictest sense, it is. We must take care, however, not to let our conceptions of the realities of Nature be rendered indistinct by those elements of metaphor which abound in language. These elements, indeed, when kept in their proper places, are not only the indispensable auxiliaries of thought, but they represent those perceptions of the mind which are the highest and the most absolutely true. They are the recognition—often the unconscious recognition—of the central Unities of Nature. Nevertheless, they are the prolific source of error when not closely watched. Because all the functions and phenomena of Life appear to be strictly connected with an Apparatus, and may therefore be regarded as brought about by adjustments which are mechanical, therefore it has been concluded that those phenomena, even the most purely mental, are mechanical in the same sense in which the work is called mechanical which human machines perform. Are not all animals "Automata?" Are they not "mere machines?" This question has been revived from age to age since philosophy began, and has been discussed in our own time with all the aid which the most recent physiological experiment can afford. It is a question of extreme interest in its bearing on our present subject. The sense in which, and the degree to which, all mental phenomena are founded on, and are the result of, mechanical adjustments,

s a question of the highest interest and importance. The henomena of Instinct, as exhibited in the lower animals, are ndoubtedly the field of observation in which the solution of his question may best be found, and I cannot better explain he aspect in which it presents itself to me, than by discussing in connection with certain exhibitions of Animal Instinct hich I had occasion to observe during the spring and summer f 1874. They were not uncommon cases. On the contrary, hey were of a kind of which the whole world is full. But not he less directly did they suggest all the problems under dis- ussion, and not the less forcibly did they strike me with the dmiration and the wonder which no familiarity can exhaust.

CHAPTER III.

ANIMAL INSTINCT IN ITS RELATION TO THE MIND OF MAN.

THE Dipper or Water-ousel (*Cinclus aquaticus*) is well known to Ornithologists as one of the most curious and interesting of British birds. Its special habitat is clear mountain streams. These it never leaves except to visit the lakes into which or from which they flow. Without the assistance of webbed feet, it has extraordinary powers of swimming and of diving—moving about upon and under the surface with more than the ease and dexterity of a fish—hunting along the bottom as if it had no power to float—floating on the top as if it had no power to sink—now diving where the stream is smooth, now where it is quick and broken, and suddenly reappearing perched on the summit of some projecting point. Its plumage is in perfect harmony with its haunts—dark, with a pure white breast, which looks exactly like one of the flashes of light so numerous in rapid streams, or one of the little balls of foam which loiter among the stones. Its very song is set to the music of rapid waters. By careful stepping along the top of a river-bank one can often get quite close to the Dipper when it is singing, and the harmony of its notes with the tinkling of the stream is really curious. It sings too when all other birds but the Robin are silent—in the depth of winter when the stones on which it sits are circled and rimed with ice. No bird, perhaps, is more specially adapted to a very special home and very peculiar habits of life. The same species, or other forms so closely similar as to seem mere varieties, are found in almost every country of the world where there are clear mountain streams. And yet it is a species having no very near affinity with any other bird, and it constitutes by itself a separate genus. It is therefore a species of great interest to the Naturalist, and raises some of the most perplexing questions connected with the "Origin of Species."

In 1874 a pair of these birds built their nest at Inveraray, in

a hole in the wall of a small tunnel constructed to carry a rivulet under the walks of a pleasure ground. The season was one of great drought, and the rivulet, during the whole time of incubation and of the growth of the young in the nest, was nearly entirely dry. One of the nestlings, when almost fully fledged, was taken out by the hand for examination, an operation which so alarmed the others that they darted out of the hole, and ran and fluttered down the tunnel towards its mouth. At that point a considerable pool of water had survived the drought, and lay in the paths of the fugitives. They did not at all appear to seek it; on the contrary, their flight seemed to be as aimless as that of any other fledgling would have been in the same predicament. But one of them stumbled into the pool. The effect was most curious. When the young bird touched the water, there was a moment of pause, as if the creature were surprised. Then instantly there seemed to wake within it the sense of its hereditary powers. Down it dived with all the facility of its parents, and the action of its wings under the water was a beautiful exhibition of the double adaptation to progression in two very different elements, which is peculiar to the wings of most of the diving birds. The young Dipper was immediately lost to sight among some weeds, and so long did it remain under water, that I feared it must be drowned. But in due time it reappeared all right, and being recaptured, was replaced in the nest.

Later in the season, on a secluded lake in one of the Hebrides, I observed a Dun-diver, or female of the Red-breasted Merganser (*Mergus Serrator*), with her brood of young ducklings. On giving chase in the boat, we soon found that the young, although not above a fortnight old, had such extraordinary powers of swimming and diving, that it was almost impossible to capture them. The distance they went under water, and the unexpected places in which they emerged, baffled all our efforts for a considerable time. At last one of the brood made for the shore, with the object of hiding among the grass and heather which fringed the margin of the lake. We pursued it as closely as we could, but when the little bird gained the shore, our boat was still about twenty yards off. Long drought had left a broad margin of small flat stones and mud

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between the water and the usual bank. I saw the little bird run up about a couple of yards from the water, and then suddenly disappear. Knowing what was likely to be enacted, I kept my eye fixed on the spot; and when the boat was run upon the beach, I proceeded to find and pick up the chick. But on reaching the place of disappearance, no sign of the young Merganser was to be seen. The closest scrutiny, with the certain knowledge that it was there, failed to enable me to detect it. Proceeding cautiously forwards, I soon became convinced that I had already overshot the mark; and, on turning round, it was only to see the chick rise like an apparition from the stones, and dashing past the stranded boat, regain the lake,—where, having now recovered its wind, it instantly dived and disappeared. The tactical skill of the whole of this manœuvre, and the success with which it was executed, were greeted with loud cheers from the whole party; and our admiration was not diminished when we remembered that some two weeks before that time the little performer had been coiled up inside the shell of an egg, and that about a month before it was apparently nothing but a mass of albumen and of fatty oils.

The third case of Animal Instinct which I shall here mention was of a different but of an equally common kind. In walking along the side of a river with overhanging banks, I came suddenly on a common Wild Duck (*Anas Boschus*), whose young were just out. Springing from under the bank, she fluttered out into the stream with loud cries and with all the struggles to escape of a helplessly wounded bird. To simulate the effects of suffering from disease, or from strong emotion, or from wounds upon the human frame, is a common necessity of the actor's art, and it is not often really well done. The tricks of the theatre are seldom natural, and it is not without reason that "theatrical" has become a proverbial expression for false and artificial representations of the realities of life. It was therefore with no small interest that on this, as on many other occasions, I watched the perfection of an art which Mrs. Siddons might have envied. The labored and half-convulsive flapping of the wings, the wriggling of the body, the straining of the neck, and the whole expression of painful and abortive effort, were really admirable. When her struggles had carried her a considerable

distance, and she saw that they produced no effect in tempting us to follow, she made resounding flaps upon the surface of the water, to secure that attention to herself which it was the great object of the manœuvre to attract. Then rising suddenly in the air, she made a great circle round us, and returning to the spot, renewed her endeavors as before. It was not, however, necessary; for the separate instinct of the young in successful hiding effectually baffled all my attempts to discover them.

I pass now from these exhibitions of Instinct in the class of birds to one which I observed in the class of insects during the recent winter, November, 1882. It was in the beautiful Riviera, where insect life continues much more active at that season than it can be anywhere in the north of Europe. But even there, although Bees are busy buring the greater part of winter, and some of our own Sylviadæ find an abundant living throughout the season, the Order of the Lepidoptera are generally dormant. I was surprised, therefore, late in the month of November, to see a large insect of this Order come from above the olive trees overhead, with the wild, dashing flight of the larger Moths. Attracted apparently by a sheltered and sunny recess in which scarlet Geraniums and Bignonias were in full flower, the Moth darted downwards, and after a little hovering, settled suddenly on the bare ground underneath a Geranium plant. I then saw that it was a very handsome species, with an elaborate pattern of light and dark chocolate browns. But the margins of the upper or anterior wings, which were deeply waved in outline, had a lustrous yellow color, like a brilliant gleam of light. In this position the Moth was a conspicuous object. After resting for a few seconds, apparently enjoying the Sun, it seemed to notice some movement which gave it alarm. It then turned slightly round, gave a violent jerk to its wings, and instantly became invisible. If it had subsided into a hole in the ground, it could not have more completely disappeared. As, however, my eyes were fixed upon the spot, I soon observed that all the interstices among the little clods around were full of withered and crumpled leaves of a deep blackish brown. I then further noticed that the spot where the Moth had sat was apparently occupied by one of these, and it then flashed upon me in a moment that I had before me one of the great wonders and mys-

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teries of Nature. There are some forms of mimicry which are wholly independent of any action on the part of the animals themselves, and this kind of mimicry is especially common in this class of insects. They are often made of the shape and of the color which are most like those of the surrounding objects in their habitat. They have nothing to do except to sit still, or perhaps to crouch. But there are other forms of mimicry in which the completeness of the deception depends on some co-operation of the animal's own will. This was one of these. The splendid margins of the upper wings, with the peculiar shape and their shining color, had to be concealed; and so, by an effort which evidently required the exertion of special muscles, these margins were somehow folded down—reverted—covered up, and thus hidden out of sight. The remainder of the wings, or the under surfaces which were now made uppermost, were so colored and so crumpled up that they imitated exactly the dried and withered leaves around.

And now I tried an experiment to test another feature in the wonderful instincts which are involved in all these operations. That feature is the implicit confidence in its success which is innate in all creatures furnished with any apparatus of concealment. I advanced in the full sunlight close up to the Moth—so close that I could see the prominent "beaded eyes," with the watchful look—and the roughened outlines of the thorax, which served to complete the illusion. So perfect was the deception, that I really could not feel absolutely confident that the black spot I was examining was what I believed it to be. Only one little circumstance reassured me. There was a small hole in the outer covering through which a mere point of the inner brilliant margin could be seen shining like a star. Certain now as to the identity of the Moth, I advanced still nearer, and finally I found that it was not till the point of a stick was used to touch and shake the earth on which it lay that the creature could believe that it was detected and in danger. Then in an instant, by movements so rapid as to escape the power of vision, the dried and crumpled leaf became a living Moth, with energies of flight defying all attempts at capture.

Let us now look at the questions which these several exhibitions of Animal Instinct cannot fail to suggest; and first let us

take the case of the young Dipper. There was no possibility of imitation here. The rivulet beneath the nest, even if it had been visible to the nestlings, had been dry ever since they had been hatched. The river into which it ordinarily flowed was out of sight. The young Dippers never could have seen the parent birds either swimming or diving. This, therefore, is one of the thousand cases which have driven the "Experience" school of philosophy to take up new ground. The young Dipper here cannot possibly have had any experience, either through the process of incipient effort, or through the process of sight and imitation. Nature is full of similar cases. In face of them it is now no longer denied that in all such cases "Innate Ideas" do exist, and that "Pre-established Harmonies" do prevail in Nature. These old doctrines, so long ridiculed and denied, have come to be admitted, and the new philosophy is satisfied with attempts to explain how these "Ideas" came to be innate, and how these Harmonies came to be pre-established. The explanation is, that though the efficiency of experience as the cause or source of Instinct must be given up as regards the individual, we may keep it as regards the race to which the individual belongs. The powers of swimming and diving, and the impulse to use them for their appropriate purpose, were indeed innate in the Dipper of 1874. But then they were not innate in its remote progenitors. They were acquired by those progenitors through gradual effort—the trying leading to success and the success again leading to more trying—both together leading first to special faculty, then to confirmed habit, and then, by hereditary transmission, to instinct "organized in the race." Well, but even if this be true, was not the disposition of the progenitors to make the first efforts in the direction of swimming and diving, and were not the Organs which enabled them to do so, as purely innate as the perfected instinct and the perfected Organs of the Dipper of to-day? Did there ever exist in any former period of the world what, so far as I know, does certainly not exist now—any animal with dispositions to enter on a new career, thought of and imagined for the first time by itself, unconnected with any Organs already fitted for and appropriate to the purpose? Even the highest acquirements of the Dog, under *highly* artificial conditions of existence, and under the guidance

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of persistent "interferences with Nature," are nothing but the special education of original instincts. In the almost human caution of the old and well-trained pointer when approaching game, we see simply a development of the habit of all predatory animals to pause when close upon an unseen prey—a pause requisite to verify the intimations of smell by the sense of sight, and also for preparing the final spring. It is true that Man "selects," but he can only select out of what is already there. The training and direction which he gives to the promptings of Instinct may properly be described as the result of experience in the animal under instruction: and it is undoubtedly true that within certain limits (which, however, are after all very narrow), these results do tend to become hereditary. But there is nothing really analogous in Nature to the artificial processes of training to which Man subjects the animals which are capable of domestication. Or if there be anything analogous—if animals by themselves can school themselves by gradual effort into the development of new powers—if the habits and powers which are now purely innate and instinctive were once less innate and more deliberate—then it will follow that the earlier faculties of animals have been the higher, and that the later faculties are the lower in the scale of Intelligence. This is hardly consistent with the accepted idea of Evolution,—which is founded on the conception of an unfolding or development from the lower to the higher, from the simple to the complex, from the Instinctive to the Rational. My own belief is, that whatever of truth there is in the doctrine of Evolution is to be found in this conception, which, so far as we can see, does seem to be embodied in the history of Organic Life. I can therefore see no light in this new explanation to account for the existence of instincts which are certainly antecedent to all individual experience—the explanation, namely, that they are due to the experience of progenitors "organized in the race." It involves assumptions contrary to the analogies of Nature, and at variance with the fundamental facts, which are the best, and indeed the only, basis of the theory of Evolution. There is no probability—there is hardly any plausibility—in the supposition that experience has had, in past times, some connection with Instinct which it has ceased to have in the present day. The Uniformity of Nature has, indeed, often

been asserted in a sense in which it is not true, and used in support of arguments which it will not sustain. All things have certainly not continued as they are since the Beginning. There was a time when Animal Life, and with it Animal Instincts, began to be. But we have no reason whatever to suppose that the nature of Instinct then or since has ever been different from its nature now. On the contrary, as we have in existing Nature examples of it in infinite variety, from the very lowest to the very highest forms of Organization, and as the same phenomena are everywhere repeated, we have the best reason to conclude that, in the past, Animal Instinct has ever been what we now see it to be—congenital, innate, and wholly independent of experience.

And indeed, when we come to think about it, we shall find that the theory of Experience assumes the pre-existence of the very powers for which it professes to account. The very lowest of the faculties by which experience is acquired is the faculty of imitation. But the desire to imitate must be as instinctive as the Organs are hereditary by which imitation is effected. Then follow in their order all the higher faculties by which the lessons of experience are put together—so that what has been in the past is made the basis of anticipation as to what will be in the future. This is the essential process by which experience is acquired, and every step in that process assumes the pre-existence of mental tendencies and of mental powers which are purely instinctive and innate. To account for Instinct by experience is nothing but an Irish bull. It denies the existence of things which are nevertheless assumed in the very terms of the denial : it elevates into a cause that which must in its nature be a consequence, and a consequence, too, of the very cause which is denied. Congenital instincts, and hereditary powers, and pre-established harmonies, are the origin of all experience, and without them no one step in experience could ever be gained. The questions raised when a young Dipper, which had never before even seen water, dives and swims with perfect ease, are questions which the theory of organized experience does not even tend to solve ; on the contrary, it is a theory which leaves those questions precisely where they were, except in so far as it may tend to obscure them by obvious confusions of thought.

Passing now from explanations which explain nothing, is there any light in the theory that animals are "Automata?" Was the young Dipper a diving machine? It seems to me that there is at least a glimmer shining through this idea—a glimmer as of a real light struggling through a thick fog. The fog arises out of the mists of language—the confounding and confusing of meanings literal with meanings metaphorical—the mistaking of partial for complete analogies. "Machine" is the word by which we designate those combinations of mechanical force which are contrived and put together by Man to do certain things. One essential characteristic of them is that they belong to the world of the not-living; they are destitute of that which we know as Life, and of all the attributes by which it is distinguished. Machines have no sensibility. When we say of anything that it has been done by a machine, we mean that it has been done by something which is not alive. In this literal signification it is therefore pure nonsense to say that anything living is a machine. It is simply a misapplication of language—to the extent of calling one thing by the name of another thing, and that other so different as to be its opposite or contradictory.

There can be no reasoning, no clearing up of truth, unless we keep definite words for definite ideas. Or if the idea to which a given word has been appropriated be a complex idea, and we desire to deal with one element only of the meaning, separated from the rest, then, indeed, we may continue to use the word for this selected portion of its meaning, provided always that we bear in mind what it is that we are doing. This may be and often is a necessary operation, for language is not rich enough to furnish separate words for all the complex elements which enter into ideas apparently very simple; and so of this word, machine, there is an element in its meaning which is always very important, which in common language is often predominant, and which we may legitimately choose to make exclusive of every other. This essential element in our idea of a machine is that its powers, whatever they may be, are derived, and not original. There may be great knowledge in the work done by a machine, but the knowledge is not in it. There may be great skill, but the skill is not in it; great foresight, but

the foresight is not in it; in short, great exhibition of all the powers of Mind, but the mind is not in the machine itself. Whatever it does, is done in virtue of its construction, which construction is due to a Mind which has designed it for the exhibition of certain powers and the performance of certain functions. These may be very simple, or they may be very complicated, but whether simple or complicated, the whole play of its operations is limited and measured by the intentions of its constructor. If that constructor be himself limited either in opportunity, or knowledge, or in power, there will be a corresponding limitation in the things which he invents and makes. Accordingly, in regard to Man, he cannot make a machine which has any of the gifts and the powers of Life. He can construct nothing which has sensibility or consciousness, or any other of even the lowest attributes of living creatures. And this absolute destitution of even apparent originality in a machine—this entire absence of any share of consciousness, or of sensibility, or of Will—is one part of our very conception of it. But that other part of our conception of a machine, which consists in its relation to a contriver and constructor, is equally essential, and may, if we choose, be separated from the rest, and may be taken as representative of the whole. If, then, there be any Agency in Nature, or outside of it, which can contrive and build up structures endowed with the gifts of Life, structures which shall not only digest, but which shall also feel and see, which shall be sensible of enjoyment from things conducive to their welfare, and of alarm on account of things which are dangerous to the same—then such structures have the same relation to that Agency which machines have to Man, and in this aspect it may be a legitimate figure of speech to call them living machines. What these machines do is different in kind from the things which human machines do; but both are alike in this—that whatever they do is done in virtue of their construction, and of the powers which have been given to them by the Mind which made them.

Applying now this idea of a machine to the phenomena exhibited by the young Dipper, its complete applicability cannot be denied. In the first place, the young Dipper had a physical structure adapted to diving. Its feathers were of a texture to

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throw off water, and the shower of pearly drops which ran off it, when it emerged from its first plunge, showed in a moment how different it was from other fledglings in its imperviousness to wet. Water appeared to be its "native element" precisely in the same sense in which it is said to be the native element of a ship which has been built high in air, and of the not very watery materials of wood and iron. Water which it had never seen before, seemed to be the native element of the little bird in this sense, that it was so constructed as to be and to feel at home in it at once. Its "lines" had been laid down for progression both in air and water. It was launched with a motive-power complete within itself, and with promptings sufficient for the driving of its own machinery. For the physical adaptation was obviously united with mental powers and qualities which partook of the same preadjusted harmony. These were as congenital as the texture of its feathers or the structure of its wing. Its terror arose on seeing the proper objects of fear, although they had never been seen before, and no experience of injury had arisen. This terror prompted it to the proper methods of escape, and the knowledge how to use its faculties for this object was as intuitive as the apparatus for effecting it was hereditary. In this sense the Dipper was a living, breathing, seeing, fearing, and diving machine—ready made for all these purposes from the nest—as some other birds are even from their first exclusion from the egg.

The case of the young Merganser is still more curious and instructive with reference to the same questions. The young of all the *Anatidæ* are born, like the gallinaceous birds, not naked or blind, as most others are, but completely equipped with a feathery down, and able to swim or dive as soon as they see the light. Moreover, the young of the Merganser have the benefit of seeing from the first the parent bird performing these operations, so that imitation may have some part in developing the perfection with which they are executed by the young. But the particular manœuvre resorted to by the young bird which baffled our pursuit was a manœuvre in which it could have had no instruction from example—the manœuvre, namely, which consists in hiding not under any cover but by remaining perfectly motionless on the ground. This is a

method of escape which cannot be resorted to successfully except by birds whose color is adapted to the purpose by a close assimilation with the coloring of surrounding objects. The old bird would not have been concealed on the same ground, and would never itself resort to the same method of escape. The young, therefore, cannot have been instructed in it by the method of example. But the small size of the chick, together with its obscure and curiously mottled coloring, are specially adapted to this mode of concealment. The young of all birds which breed upon the ground are provided with a garment in such perfect harmony with surrounding effects of light as to render this manœuvre easy. It depends, however, wholly for its success upon absolute stillness. The slightest motion at once attracts the eye of any enemy which is searching for the young. And this absolute stillness must be preserved amid all the emotions of fear and terror which the close approach of the object of alarm must, and obviously does inspire. When comes this splendid, even if it be unconscious faith in the sufficiency of a defence which it must require such nerve and strength of Will to practise? No movement, not even the slightest, though the enemy should seem about to trample on it; such is the terrible requirement of Nature—and by the child of Nature implicitly obeyed! Here again, beyond all question, we have an instinct as much born with the creature as the harmonious tinting of its plumage—the external furnishing being inseparably united with the internal furnishing of Mind which enables the little creature in very truth to "walk by faith and not by sight." Is this automatonism? Is this machinery? Yes, undoubtedly in the sense explained before—that the instinct has been given to the bird in precisely the same sense in which its structure has been given to it—so that anterior to all experience, and without the aid of instruction or of example, it is inspired to act in this manner on the appropriate occasion arising.

Then, in the case of the Wild Duck, we rise to a yet higher form of Instinct, and to more complicated adaptations of congenital powers to the contingencies of the external world. It is not really conceivable that Wild Ducks have commonly many opportunities of studying each other's action when rendered

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helpless by wounds. Nor is it conceivable that such study can have been deliberately made even when opportunities do occur. When one out of a flock is wounded all the others make haste to escape, and it is certain that this trick of imitated helplessness is practised by individual birds which can never have had any such opportunities at all. Moreover, there is one very remarkable circumstance connected with this instinct, which marks how much of knowledge and of reasoning is implicitly contained within it. As against Man the manœuvre is not only useless but it is injurious. When a man sees a bird resorting to this imitation, he may be deceived for a moment, as I have myself been; but his knowledge and experience and his reasoning faculty soon tell him from a combination of circumstances that it is merely the usual deception. To Man, therefore, it has the opposite effect of revealing the proximity of the young brood, which would not otherwise be known. I have repeatedly been led by it to the discovery of the chicks. Now, the most curious fact of all is that this distinction between Man and other predacious animals is recognized and reflected in the instinct of birds. The manœuvre of counterfeiting helplessness is very rarely resorted to except when a Dog is present.* Dogs are almost uniformly deceived by it. They never can resist the temptation presented by a bird which flutters apparently helpless just in front of their nose. It is, therefore, almost always successful in drawing them off, and so rescuing the young from danger. But it is the sense of smell, not the sense of sight, which makes Dogs so specially dangerous. The instinct which has been given to birds seems to cover and include the knowledge that as the sense of smell does not exist to the like effect in Man, the mere concealment of the young from sight is ordinarily, as regards him, sufficient for their protection: and yet I have on one occasion seen the trick resorted to when Man only was the source of danger, and this by a species of bird which does not habitually practise it, and which can have had neither individual nor ancestral experience. This was the case of a Blackcap (*Sylvia Atricapilla*), which fell to

* I have since seen it resorted to by the American Merganser, on the Restigouche River, in Canada, when the object of alarm was a barge "poled" or "punted" down the stream. It evidently gave the impression of an enemy chasing the young on the water.

the ground from a bush as if wounded, in order to distract attention from its nest.

If now we examine, in the light of our own Reason, all the elements of knowledge or of intellectual perception upon which the instinct of the Wild Duck is founded, and all of which, as existing somewhere, it undoubtedly reflects, we shall soon see how various and extensive these elements of knowledge are. First, there is the knowledge that the cause of the alarm is a carnivorous animal. On this fundamental point no creature is ever deceived. The youngest chick knows a Hawk, and the dreadful form fills it with instant terror. Next, there is the knowledge that Dogs and other carnivorous quadrupeds have the sense of smell, as an additional element of danger to the creatures on which they prey. Next, there is the knowledge that the Dog, not being itself a flying animal, has sense enough not to attempt the pursuit of prey which can avail itself of this sure and easy method of escape. Next, there is the conclusion from all this knowledge, that if the Dog is to be induced to chase, it must be led to suppose that the power of flight has been somehow lost. And then there is the further conclusion, that this can only be done by such an accurate imitation of a disabled bird as shall deceive the enemy into a belief in the possibility of capture. And lastly, there are all the powers of memory and the qualities of imagination which enable good acting to be performed. All this reasoning and all this knowledge is certainly involved in the action of the bird-mother, just as certainly as reasoning and knowledge of a much profounder kind is involved in the structure or adjustment of the Organic machinery by which and through which the action is itself performed.

In the case of the Moth upon the Riviera, we have the same general principles involved and rendered in some repects more remarkable, in proportion to the much lower Intelligence which belongs to the Class of insects as compared with the Class of birds. But the law is the same in both cases—the law, namely, of a close and perfect correspondence between the physical machinery for any given purpose, and the psychological endowments which enable that machinery to be properly applied. It surprised me to see this Moth lighting on the bare ground un-

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derneath the leaves and flowers which seemed to attract its attention. But if this choice and selection had not been made, and if it were not habitually made by this species of Moth, its apparatus of disguise would have been useless for the intended purpose. The Moth might, indeed, in any situation exert the muscles which reverted the wing, and which degraded the whole appearance of its body into the semblance of dead and rotten vegetation. But then, in every situation except that actually chosen, such an object would not have evaded notice, but on the contrary would have attracted it. And therefore it was that the Moth passed by all the beautiful leaves and flowers, and settled rather on a clod. But this "therefore," with all the train of reasoning which the choice involved, we cannot suppose to have existed consciously in the Moth. Yet that it existed somewhere is as certain as the existence of the Organic structure by which the disguise was rendered possible, or the existence of the Instinct in the creature, which is at once the index and the consummation of the whole arrangement.

There is unquestionably a sense, and a very important sense, in which all these wonderful operations of Instinct are "automatic." The intimate knowledge of physical and of physiological laws—the knowledge even of the mental qualities and dispositions of other animals—and the processes of reasoning by which advantage is taken of these,—this knowledge and this reasoning cannot, without manifest absurdity, be attributed to the birds themselves. This is admitted at least as regards the birds of the present day. But surely the absurdity is quite as great if this knowledge and reasoning, or any part of it, be attributed to birds of a former generation. In the past history of the species there may have been change—there may have been development. But there is not the smallest reason to believe that the progenitors of any bird or of any beast, however different in form, have ever founded on deliberate effort the instincts of their descendants. All the knowledge and all the resources of Mind which is involved in these instincts is a reflection of some Agency which is outside the creatures which exhibit them. In this respect it may be said with truth that they are machines. But then they are machines with this peculiarity, that they not only reflect, but also in various measures

and degrees partake of the attributes of Mind. It is always by some one or other of these attributes that they are guided—by fear, or by desire, or by affection, or by mental impulses which go straight to the results of reasoning without its processes. That all these mental attributes are connected with a physical Organism which is constructed on mechanical principles, is now a matter of speculation. It is an obvious and acknowledged fact. The question is not whether, in this sense, animals are machines, but whether the work which has been assigned to them does or does not partake in various measures and degrees of the various qualities which we recognize in ourselves as the qualities of sensation, of consciousness, and of Will.

On this matter it seems clear to me that in some recent discussions the doctrine of Descartes has been seriously misconceived. It is true that a passage has been quoted * as representing the view of "orthodox Cartesians," in which it is asserted that animals "eat without pleasure and cry without pain," and that they "desire" nothing as well as "know" nothing. But this passage is quoted, not from Descartes, but from Malebranche. Malebranche was a great man; but on this subject he was the disciple and not the master; and it seems almost a law that no utterance of original genius can long escape the fate of being travestied and turned to nonsense by those who take it up at second hand. Descartes' letter to Moore of the 5th February, 1649, proves conclusively that he fully recognized in the lower animals the existence of all the affections of Mind except "Thought" (*la Pensée*), or Reason properly so called. He ascribes to them the mental emotions of fear, of anger, and of desire, as well as all the sensations of pleasure and of pain. What he means by Thought is clearly indicated in the passage in which he points to Language as the peculiar product and the sole index of Thought—Language, of course, taken in its broadest sense, signifying any system of signs by which general or abstract ideas are expressed and communicated. This, as Descartes truly says, is never wanting even in the lowest of men, and is never present in the highest of the brutes. But he distinctly says that the lower animals, having the same Organs of sight, of hearing, of taste, etc., with ourselves, have also the

* By Professor Huxley.

same sensations, as well as the same affections of anger, of fear, and of desire—affections which, being mental, he ascribes to a lower kind or class of Soul, an "ame corporelle." Descartes, therefore, was not guilty of confounding the two elements of meaning which are involved in the word machine—that element which attaches to all machines made by Man as consisting of dead non-sentient matter—and that other element of meaning which may be legitimately attached to structures which have been made, not to simulate, but really to possess all the essential properties of Life. "Il faut pourtant remarquer," says Descartes, emphatically; "que je parle de la pensée, *non de la vie, ou de sentiment.*"*

The experiments quoted by Professor Huxley and by other physiologists, on the phenomena of vivisection, and especially on what is called the "reflex action" of living nerve-tissues, cannot alter or modify the general conclusions which have long been reached on the unquestionable connection between all the functions of Life and the mechanism of the body. The question remains whether the ascertainment of this connection in its details can alter our conceptions of what Life and sensation are. No light is thrown on this question by cutting out from an Organism certain parts of the machinery which are known to be the seat of consciousness and of Will, and then finding that the animal is still capable of certain movements which are usually indicative of sensation and of purpose. Surely the reasoning is bad which argues that because a given movement goes on after the animal has been mutilated, this movement must therefore continue to possess all the same elements of character which accompanied it when the animal was complete. And not only is the reasoning bad, but as a matter of fact the conclusion has been proved to be erroneous. Farther investigations have shown that when the cerebral hemispheres have been removed, the "reflex action" in a frog's leg acquires a new character. It becomes a mere result of Physical Causation, and is consequently as certain and inevitable as the action of a coiled spring. Accordingly it can be predicted and foreseen with certainty. In short, the mental element has been eliminated along with that part of the machinery which is the Organ of con-

* Œuvres de Descartes (Cousin), vol. x. p. 205 et seq.

sciousness and Will. But when that part of the machinery remains untouched, then "reflex action" loses its character of necessity as the result of mere mechanical causation. It cannot be predicted with certainty, because although the "stimulus" may be the same, and the animal impulse may be the same, there is a controlling apparatus to which has been given the free and incalculable power of resisting both stimulus and impulse. Both parts of the apparatus are equally machinery. But the one has a mental function, and the other has a function purely physical.*

The character of purpose in one sense or another belongs to all Organic movements whatever—to those which are independent of conscious sensation, or of the Will, as well as to those which are voluntary and intentional. The only difference between the two classes of movement is that in the case of one of them the purpose is wholly outside the animal, and that in the case of the other class of movement the animal has faculties which make it, however indirectly, a conscious participant or agent in the purpose, or in some part of the purpose, to be subserved. The action of the heart in animals is as certainly "purposive" in its character as the act of eating and deglutition. In the one the animal is wholly passive—has no sensation, no consciousness, however dim. In the other movement the animal is an active agent, is impelled to it by desires which are in the nature of mental affections, and receives from it the appropriate pleasure which belongs to consciousness and sensation. These powers themselves, however, depend, each of them, on certain bits and parts of the animal mechanism; and if these parts can be separately injured or destroyed, it is intelligible enough that consciousness and sensation may be severed for a time from the movements which they ordinarily accompany and direct. The success of such an experiment may teach us much on the details of a general truth which has long been known—that conscious sensation is, so far as our experience goes, inseparably dependent upon the mechanism of an Organic structure. But it cannot in the slightest degree change or modify our conception of what conscious sensation in itself is. It is mechanical exactly in the same sense in which we have long known it to be so—

* Foster's "Text-Book of Physiology," p. 557.

that is to say, it is the result of Life working in and through a structure which has been made to exhibit and embody certain special gifts and powers.

Considering now that the body of Man is one in structure with the body of all vertebrate animals—considering that, as we rise from the lowest of these to him who is the highest, we see this same structure elaborated into closer and closer likeness, until every part corresponds, bone to bone, tissue to tissue, organ to organ—I cannot doubt that Man is a machine, precisely in the same sense in which animals are machines. If it is no contradiction in terms to speak of a machine which has been made to feel and to see, and to hear and to desire, neither need there be any contradiction in terms in speaking of a machine which has been made to think, and to reflect, and to reason. These are, indeed, powers so much higher than the others that they may be considered as different in kind. But this difference, however great it may be, whether we look at it in its practical results, or as a question of classification, is certainly not a difference which throws any doubt upon the fact that all these higher powers are, equally with the lowest, dependent in this world on special arrangements in a material Organism. It seems to me that the very fact of the question being raised whether man can be called a machine in the same sense as that in which alone the lower animals can properly be so described, is a proof that the questioner believes the lower animals to be machines in a sense in which it is not true. Such manifestations of mental attributes as they display are the true and veritable index of powers which are really by them possessed and enjoyed. The notion that because these powers depend on an Organic Apparatus, they are therefore not what they seem to be, is a mere confusion of thought. On the other hand, when this comes to be thoroughly understood, the notion that Man's peculiar powers are lowered and dishonored when they are conceived to stand in any similar relation to the body, must be equally abandoned, as partaking of the same fallacy. If the sensation of pleasure and of pain, and the more purely mental manifestations of fear and of affection, have in the lower animals some inseparable connection with an Organic Apparatus, I do not see why we should be jealous of admitting that the still higher powers of self-consciousness and

Reason have in Man a similar connection with the same kind o mechanism. The nature of this connection in itself is equall mysterious, and, indeed, inconceivable in either case. As matter of fact, we have precisely the same evidence as to both If painful and pleasurable emotions can be destroyed by the cut ting of a nerve, so also can the powers of Memory and of Rea son be destroyed by any injury or disease which affects som bits of the substance of the brain.

If, however, the fact of this mysterious connection be so in terpreted as to make us alter our conceptions of what self-con sciousness, and Reason, and all mental manifestations in them selves are, then indeed we may well be jealous—not of the facts, but of the illogical use which is often made of them. Self-con sciousness and Reason and Affection, and Fear, and Pain, and Pleasure, are in themselves exactly what we have always known them to be; and no discovery as to the physical Apparatus with which they are somehow connected can throw the smallest obscurity on the criteria by which they are to be identified as so many different phenomena of Mind. Our old knowledge of the work done is in no way altered by any new information as to the Apparatus by which it is effected. This is the error committed by those who think they can found a new Psychology on the knife. They seem to think that Sensation and Memory, and Reasoning and Will, become something different from that which hitherto we have known them to be, when we have found out that each of these powers may have some special "seat" or "organ" in the body. This, however, is a pure delusion. The known element in Psychology is always the nature of the mental faculty; the unknown element is always the nature of its connection with any Organ. We know the operations of our own minds with a fulness and reality which does not belong to any other knowledge whatever. We do not know the bond of union between these operations and the brain, except as a sort of external and wholly unintelligible fact. Remembering all this, then, we need not fear or shrink from the admission that Man is a reasoning and self-conscious machine, just in the same sense in which the lower animals are machines which have been made to exhibit and possess certain mental faculties of a lower class.

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But what of this? What is the value of this conclusion? Its value would be small indeed if this conception of ourselves as machines could be defended nly as a harmless metaphor. But there is far more to be said for it and about it than this. The conception is one which is not only harmless, but profoundly true, as all metaphors are when they are securely rooted in the Homologies of Nature. There is much to be learnt from that aspect of Mind in which we regard its powers as intimately connected with a material Apparatus, and from that aspect of our own bodies in which they are regarded as one in structure with the bodies of the brutes. Surely it would be a strange object of ambition to try to think that we are not included in the vast System of Adjustment which we have thus traced in them; that our nobler faculties have no share in the secure and wonderful guarantee which it affords for the truthfulness of all mental gifts. It is well that we should place a high estimate on the superiority of the powers which we possess; and that the distinction, with all its consequences, between self-conscious Reason and the comparatively simple perceptions of the Beasts, should be ever kept in view. But it is not well that we should omit from that estimate a common element of immense importance which belongs to both, and the value of which becomes immeasurably greater in its connection with our special gifts. That element is the element of Adjustment —the element which suggests the idea of an Apparatus—the element which constitutes all our higher faculties the index and the result of a Pre-adjusted Harmony. In the light of this conception we can see a new meaning in our "place in Nature;" that place which, so far as our bodily Organs are concerned, assigns to us simply a front rank among the creatures which are endowed with Life. It is in virtue of that place and association that we may be best assured that our special gifts have the same relation to the higher realities of Nature which the lower faculties of the Beasts have to the lower realities of the physical world. Whatever we have that is peculiar to ourselves is built up on the same firm foundation on which all Animal Instinct rests.

It is often said that we can never really know what unreasoning Instinct is, because we can never enter into an animal mind,

and see what is working there. Men are so apt to be arrogant in philosophy that it seems almost wrong to deprecate even any semblance of the consciousness of ignorance. But it were much to de desired that the modesty of Philosophers would come in the right places. I hold that we can know, and can almost thoroughly understand, the instincts of the lower animals; and this, for the best of all reasons, that we are ourselves animals, whatever more;—having, to a large extent, precisely the same instincts, with the additional power of looking down upon ourselves in this capacity from a higher elevation to which we can ascend at will. Not only are our bodily functions precisely similar to those of the lower animals,—some, like the beating of the heart, being purely "automatic" or involuntary—others being partially, and others again being wholly, under the control of the Will,—but many of our sensations and emotions are obviously the same with the sensations and emotions of the lower animals, connected with precisely the same machinery, presenting precisely the same phenomena, and recognizable by all the same criteria.

It is true that many of our actions become instinctive and mechanical only as the result of a previous intellectual operation of the self-conscious or reasoning kind. And this, no doubt, is the origin of the dream that all Instinct, even in the animals, has had the same origin; a dream due to the exaggerated "Anthropomorphism" of those very philosophers who are most apt to denounce this sort of error in others. But Man has many instincts like the animals, to which no such origin in personal experience or in previous reasoning can be assigned. For not only in earliest infancy, but throughout life, we do innumerable things to which we are led by purely organic impulse; things which have indeed a reason and a use, but a reason which we never know, and a use which we never discern, till we come to "think." And how different this process of "thinking" is we know likewise from our own experience. In contemplating the phenomena of reasoning and of conscious deliberation, it really seems as if it were impossible to sever it from the idea of a double Personality. Tennyson's poem of the "Two Voices" is no poetic exaggeration of the duality of which we are conscious when we attend to the mental operations of our own

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most complex nature. It is as if there were within us one Being always receptive of suggestions, and always responding in the form of impulse—and another Being capable of passing these suggestions in review before it, and of allowing or disallowing the impulses to which they give rise. There is a profound difference between creatures in which one only of these voices speaks, and Man, whose ears are, as it were, open to them both. The things which we do in obedience to the lower and simpler voice are indeed many, various, and full of a true and wonderful significance. But the things which we do and the affections which we cherish, in obedience to the higher voice, have a rank, a meaning, and a scope which is all their own. There is no indication in the lower animals of this double Personality. There is no indication that they hear any voice but one; and there is every indication that in obeying it the whole law of their Being is perfectly fulfilled. This it is which gives such restfulness to Nature, whose abodes are indeed what Wordsworth calls them—

"Abodes where Self-disturbance hath no part."

On the other hand, the double Personality, the presence of "Two Voices," is never wholly wanting even in the most degraded of human Beings—their thoughts everywhere "accusing or else excusing one another."

Knowing, therefore, in ourselves both these kinds of operation, we can measure the difference between them, and we can thoroughly understand how animals may be able to do all that they actually perform, without ever passing through the processes of argument by which we reach the conclusions of conscious Reason and of moral Obligation. Moreover, seeing and feeling the difference, we can see and feel the relations which obtain between the two classes of mental work. The plain truth is, that the higher and more complicated work is done, and can only be done in this life, with the materials supplied by the lower and simpler tools. Nay, more, the very highest and most inspiring mental processes rest upon the lower, as a building rests upon its foundation-stones. The impressions and conceptions which belong to Instinct are like the rude but massive

substructions from which some great Temple springs. Not only is the impulse, the disposition, and the ability to reason as purely intuitive and congenital in Man as the disposition to eat, but the fundamental axioms on which all reasoning rests are, and can only be, intuitively perceived. This, indeed, is the essential character of all the axioms or self-evident propositions which are the basis of reasoning, that the truth of them is perceived by an act of apprehension, which, if it depends on any process, depends on a process unconscious, involuntary, and purely automatic. But this is the definition, the only definition, of Instinct or Intuition. All conscious reasoning thus starts from the data which this great Faculty supplies; and all our trust and confidence in the results of reasoning must depend on our trust and confidence in the Adjusted Harmony which has been established between Instinct and the truths of Nature.

Not only is the idea of mechanism consistent with this confidence, but it is inseparable from it. No firmer ground for that confidence can be given us in thought than this conception, —that as the eye of sense is a mechanism specially adjusted to receive the light of heaven, so is the mental eye a mechanism specially adjusted to perceive those realities which are in the nature of necessary and eternal Truth. Moreover, the same conception helps us to understand the real nature of those limitations upon our faculties which curtail their range, and which yet, in a sense, we may be said partially to overpass in the very act of becoming conscious of them. We see it to be a great law prevailing in the instincts of the lower animals, and in our own, that they are true not only as guiding the animal rightly to the satisfaction of whatever appetite is immediately concerned, but true also as ministering to ends of which the animal knows nothing, although they are ends of the highest importance, both in its own economy and in the far-off economies of Creation. In direct proportion as our own minds and intellects partake of the same nature, and are founded on the same principle of Adjustment, we may feel assured that the same law prevails in their nobler work and functions. And the glorious law is no less than this—that the work of Instinct is true not only for the short way it goes, but for that infinite distance into which it leads in a right direction.

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I know no argument better fitted than this to dispel the sickly dreams, the morbid misgivings, of the Agnostic. Nor do I know of any other conception as securely founded on science, properly so called, which better serves to render intelligible and to bring within the familiar analogies of Nature those higher and rarer mental gifts which we know as Genius, and even that highest and rarest of all which we understand as Inspiration. That the human Mind is always in some degree, and that certain individual minds have been in a special degree, reflecting surfaces, as it were, for the verities of the unseen and eternal world, is a conception having all the characters of coherence which assure us of its harmony with the general constitution and the common course of things.

And so this doctrine of Animal Automatism—the notion that the Mind of Man is indeed a structure and a mechanism—a notion which is held over our heads as a terror and a doubt—becomes, when closely scrutinized, the most comforting and reassuring of all conceptions. No stronger assurance can be given us that our Faculties, when rightly used, are Powers on which we can indeed rely. It reveals what may be called the strong physical foundations on which the truthfulness of Reason rests. And more than this—it clothes with the like character of trustworthiness every instinctive and intuitive affection of the human soul. It roots the reasonableness of Faith in our conviction of the Unities of Nature. It tells us that as we know the instincts of the lower animals to be the index and the result of Laws which are out of sight to them, so also have our own higher instincts the same relation to Truths which are of corresponding dignity and of corresponding scope.

Nor can this conception of the Mind of Man being connected with an adjusted mechanism cast, as has been suggested, any doubt on the freedom of the Will—such as by the direct evidence of consciousness, we know that freedom to be. This suggestion is simply a repetition of the same inveterate confusion of thought which has been exposed before. The question what our powers are is in no way affected by the admission or discovery that they are all connected with an Apparatus. Consciousness does not tell us that we stand unrelated to the System of things of which we form a part. We dream—or

rather we simply rave—if we think we are free to choose among things which are not presented to our choice,—or if we think that choice itself can be free from motives,—or if we think that we can find any motive outside the number of those to which by the structure of our Mind and of its Organ we have been made accessible. The only freedom of which we are really conscious is freedom from compulsion in choosing among things which are presented to our choice,—consciousness also attesting the fact that among those things some are coincident and some are not coincident with acknowledged Obligation. This, and all other direct perceptions, are not weakened but confirmed by the doctrine that our minds are connected with an Adjusted Mechanism. Because the first result of this conception is to establish the evidence of consciousness when given under healthy conditions, and when properly ascertained, as necessarily the best and the nearest representation of the truth. This it does in recognizing ourselves, and all the faculties we possess, to be nothing but the result and index of an Adjustment contrived by and reflecting the Mind which is supreme in Nature. We are derived and not original. We have been created, or—if any one likes the phrase better—we have been "evolved;" not, however, out of nothing, nor out of confusion, nor out of lies,—but out of "Nature," which is but a word for the whole Sum and System of intelligible things —the embodiment of all Order, the expression of all Truth—the issue of the Fountain in which all fulness dwells.

CHAPTER IV.

ON THE LIMITS OF HUMAN KNOWLEDGE CONSIDERED WITH REFERENCE TO THE UNITY OF NATURE.

AND yet, although it is to Nature in this highest and widest sense that we belong—although it is out of this fountain that we have come, and it is out of its fulness that we have received all that we have and are, men have doubted, and will doubt again, whether we can be sure of anything concerning it.

If this terrible misgiving had affected individual minds alone in moments of weariness and despair, there would have been little to say about it. Such moments may come to all of us, and the distrust which they leave behind them may be the sorest of human trials. It is no unusual result of abortive yet natural effort, and of innate yet baffled curiosity. But this doubt, which is really nothing more than a morbid effect of weakness and fatigue, has been embraced as a doctrine and systematized into a Philosophy. Nor can it be denied that there are some partial aspects of our knowledge in which its very elements seem to dissolve and disappear under the power of self-analysis, so that the sum of it is reduced to little more than a consciousness of ignorance. All that we know of Matter is so different from all that we are conscious of in Mind, that the relations between the two are really incomprehensible and inconceivable to us. Hence this relation constitutes a region of darkness in which it is easy to lose ourselves in an abyss of utter scepticism. What proof have we—it has been often asked—that the mental impressions we derive from objects are in any way like the truth? We know only the phenomena, not the reality of things. We are conversant with things as they appear, not with things as they are "in themselves." What proof have we that these phenomena give us any real knowledge of the truth? How, indeed, is it possible that knowledge so "relative" and so "conditioned"—relative to a mind so limited, and conditioned by senses which tell us of nothing but sensations—how can such knowledge be accepted as substantial? Is it not plain that our

conceptions of Creation and of a Creator are all mere "Anthropomorphism?" Is it not our own shadow that we are always chasing? Is it not a mere bigger image of ourselves to which we are always bowing down?

It is upon suggestions such as these that the Agnostic philosophy, or the philosophy of Nescience, is founded—the doctrine that, concerning all the highest problems which it both interests and concerns us most to know, we never can have any knowledge or any rational and assured belief.

It may be well to come to the consideration of this doctrine along those avenues of approach which start from the conception we have now gained of the Unity of Nature.

Nothing, certainly, in the human Mind is more wonderful than this—that it is conscious of its own limitations. For it is to be observed that such consciousness would be impossible if these limitations were in their nature absolute. The bars which we feel so much, and against which we so often beat in vain, are bars which could not be felt at all unless there were something in us which seeks a wider scope. It is as if these bars were a limit of opportunity rather than a boundary of power. No absolute limitation of mental faculty ever is, or ever could be, felt by the creatures whom it affects. Of this we have abundant evidence in the lower animals, and in those lower faculties of our own nature which are of like kind to theirs. Our bodily appetites can seek nothing beyond or beside the objects of their desire. To the attainment of these objects that desire is limited, and with this attainment it is satisfied. Moreover, when a bodily appetite is satisfied, it for the time ceases to exist, and may even be converted into nausea and disgust towards that which had been the object of pursuit. This is the necessary effect of a limitation which is absolute. But the case is very different with the appetites of the Mind, and still more with the cravings of the Spirit. Even in the purest physical investigations we are perpetually encountering some mental barrier through which we cannot break, and over which we cannot see. And yet we know it and feel it to be a barrier and nothing more. We stop in front of it not because we are satisfied, but because it bars our way. Not only do we know that there is something on the other side, but we know that the things on the other side

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are so closely related to the things on this side that without some vision of them we cannot really understand even the things we see. We feel our own ignorance, and our own helplessness, not because we have reached, but because we cannot reach, the limits of our intellectual powers, and because the desires which correspond to them are consequently left unsatisfied. This is the difference between ourselves and the lower animals. We can perfectly understand the absolute limitations under which they lie, because in many of our lower faculties we share these limitations with the Beasts. All their powers and many of our own are exerted without any sense of limitation, and this because of the very fact that the limitation of them is absolute and complete. In their own nature they admit of no larger use. The field of effort and of attainable enjoyment is, as regards them, co-extensive with the whole field in view. Nothing is seen, or felt, or wished for by them which may not be possessed. In such possession all exertion ends, and all desire is satisfied. This is the law of every faculty subject to a limit which is absolute; and where this law does not apply, there we may be sure that the limitation is not absolute but conditional.

Now this is the state of things in respect to all the higher faculties of the human Mind, when viewed in relation to the objects of their desire. These objects are never attained fully, and as a necessary consequence that desire is never wholly satisfied. Not only do we know vaguely that there are things of which we are ignorant, but very often we know precisely what it is that we ask, and ask in vain. Moreover, the questions which excite our interest most, and which we feel to be most insoluble, are precisely those which most nearly concern ourselves. Not to speak of the connection of the Body and the Mind, not to speak of the nature of Life, or still more of the nature of Death,—the simplest questions connected with our own Organization are unanswered and unanswerable. Science gives us no help, because the explanations which to it are ultimate are not ultimate at all to the faculties which seek for more light concerning them. The very language of science is, in this respect, often more deceptive than helpful, inasmuch as it is the fashion of scientific men to pass off as explanations, the mere re-statement of facts concealed under words derived from the

dead languages. Perhaps it is all that they can do: but at least the poverty of the device should be seen and known. The "atoms" and the "molecules"—the "cells" and the "differentiated structures"—are these the builders,—or are they only the bricks and stones? And the Forces and the Energies which work in these and upon these, what are they? And if these are undying and inexhaustible, how are all the forms in which they are embodied so fugitive and evanescent? Our desire of knowing these things is more intense in proportion to the overwhelming interest which our faculties do feel and recognize as belonging to them. In the contrast between the eagerness of these appetites of the Mind, and the conscious weakness of the powers by which they can be satisfied, we see a condition of things on which the Unity of Nature throws an important light. In physics, the existence of any pressure is the index of a "potential energy" which, though it may be doing no work, is yet always capable of doing it. And so in the intellectual world the sense of pressure and confinement is the index of power which under other conditions are capable of doing what they cannot do at present. It is in these conditions that the barrier consists, and at least to a large extent they are external. What we feel, in short, is less an incapacity than a restraint.

So much undoubtedly is to be said as to the nature of those limitations on our mental powers of which we are conscious. And the considerations thus presented to us are of immense importance in qualifying the conclusions to be drawn from the facts of consciousness. They do not justify, although they may account for, any feeling of despair as to the ultimate accessibility of that knowledge which we so much desire. On the contrary, they suggest the idea that there is within us a Reserve of Power to some unknown and indefinite extent. It is as if we could understand indefinitely more than we can discover, if only some higher Intelligence would explain it to us.

But if it is of importance to take note of this Reserve of Power of which we are conscious in ourselves, it is at least of equal importance to estimate aright the conceptions to which we can and do attain without drawing upon this Reserve at all. Not only are the bars confining us bars which we can conceive *removed*, but they are bars which in certain directions offer no

impediment at all to a boundless range of vision. Perhaps there is no subject on which the fallacies of philosophic phraseology have led to greater errors. "That the Finite cannot comprehend the Infinite," is a proposition constantly propounded as an undoubted and all-comprehensive truth. Such truth as does belong to it seems to come from the domain of Physics, in which it represents the axiom that a part cannot be equal to the whole. From this, in the domain of Mind, it comes to represent the truth, equally undeniable, that we cannot know all that Infinity contains. But the meaning into which it is liable to pass when applied to Mind is that Man cannot conceive Infinity. And never was any proposition so commonly accepted which, in this sense, is so absolutely devoid of all foundation. Not only is Infinity conceivable by us, but it is inseparable from conceptions which are of all others the most familiar. Both the great conceptions of Space and Time are, in their very nature, infinite. We cannot conceive of either of these as subject to limitation. We cannot conceive of a moment after which there shall be no more Time, nor of a boundary beyond which there is no more Space. This means that we cannot but think of Space as infinite, and of Time as everlasting.

If these two conceptions stood alone they would be enough; for in regard to them the only incapacity under which we labor is the incapacity to conceive the Finite. All the divisions of Space and Time with which we are so familiar,—our days and months and years, and our various units of distance,—we can only think of as bits and fragments of a whole which is illimitable. And although these great conceptions of Space and Time are possibly the only conceptions to which the idea of infinity attaches as an absolute necessity of Thought, they are by no means the only conceptions to which the same idea can be attached, and probably ought to be so. The conception of Matter is one, and the conception of Force* is another, to which we do not perhaps attach, as of necessity, the idea of

* I use the word "Force" as the cause or source of "Energy." Professor Tait now maintains that Force has no real or objective existence. But the arguments for this proposition would be equally valid against the "reality" of Sound and of Light, and of other things for which we must have a name. In all these cases the name or the word denotes, not a "thing," but a group of relations among "things." This however is equally true of "Energy." See a paper "On the Reality of Force," by W. R. Browne, C.E., *Phil. Mag.*, Nov., 1883.

indestructibility, or the idea of eternal existence and of infinite extension. But it is remarkable that in exact proportion as science advances, we are coming to understand that both of these are conceptions to which the idea of infinity not only may be, but ought to be attached. That is to say, that the eternal existence of Matter and the eternal duration of Force are not only conceivable but true. Nay, it may be our ignorance alone that makes us think we can conceive the contrary. It is possible to conceive of Space being utterly devoid of Matter, only perhaps because we are accustomed to see and to think of spaces which are indeed empty of visible substances. We can expel also the invisible substances or gases of the atmosphere, and we can speak and think of the result as a "vacuum." But we know now that when air and all other terrestrial gases are gone the luminiferous medium remains; and so far as we have means of knowing, this medium is ubiquitous and omnipresent in the whole Universe of Space. In like manner we are accustomed to see solid matter so dissipated as to be invisible, intangible, and wholly imperceptible; and therefore we think we can imagine Matter to be really destructible. But the more we know of it, the more certain we become that it cannot be destroyed, and can only be redistributed. In like manner, in regard to Force, we are accustomed to see Matter in what is called statical equilibrium—that is to say, at rest; and so perhaps we think we can conceive the cessation or extinction of Force. But here again the progress of research is tending more and more to attach irrevocably the idea of indestructibility—that is, of eternal existence—to that which we know as Force.

The truth is, that this conception is really implicitly involved in the conception of the indestructibility of Matter. For all that we know of Matter is inseparably connected with the Forces which it exerts, or which it is capable of exerting, or which are being exerted in it. The force of gravitation seems to be all-pervading, and to be either an inherent power or property in every kind, or almost every kind of Matter,* or else to be the result of some kind of energy

* So far as known the luminiferous medium is not ponderable. But, on the other *hand, it is, not improbably,* concerned in gravitation as a cause.

which is universal and unquenchable. All bodies, however passive and inert they may seem to be under certain conditions, yet indicate by their very existence the power of those molecular forces to which the cohesion of their atoms is due. The fact is now familiar to us that the most perfect stillness and apparent rest in many forms of Matter, is but the result of a balance or equilibrium maintained between forces of the most tremendous energy, which are ready to burst forth at a moment's notice, when the conditions are changed under which that balance is maintained. And this principle, which has become familiar in the case of what are called explosive substances, because of the ease and the certainty with which the balanced forces can be liberated, is a principle which really prevails in the composition of all material substances whatever; the only difference being that the energies by which their molecules are held together are so held under conditions which are more stable—conditions which it is much more difficult to change—and conditions, therefore, which conceal from us the universal prevalence and power of Force in the constitution of the material Universe. It is, therefore, distinctly the tendency of science more and more to impress us with the idea of the unlimited duration and indestructible nature both of Matter and of the energies which work in it and upon it.

One of the scientific forms under which this idea is expressed is the Conservation of Energy. It affirms that though we often see moving bodies stopped in their course, and the energy with which they move apparently extinguished, no such extinction is really effected. It affirms that this energy is merely transformed into other kinds of motion, which may or may not be visible, but which, whether visible or not, do always really survive the motion which has been arrested. It affirms, in short, that Energy, like Matter, of which indeed it is but an incident and an attribute, cannot be destroyed or lessened in quantity, but can only be redistributed.

As, however, the whole existing Order of Nature depends on very special distributions and concentrations of Force, this doctrine affords no ground for presuming on the permanence, or even on the prolonged continuance, of that Order. Quite

the contrary; for another general conception has been attained from science which at first sight appears to be a contradiction of the doctrine of "Conservation of Energy"—namely, the "Dissipation of Energy." This doctrine, however, does not affirm that Energy can be dissipated in the sense of being wholly lost or finally extinguished. It only affirms that all the existing concentrations and arrangements of Force are marked as temporary—that they are being gradually exhausted, and that the forces concerned in them are being diffused (generally in the form of Heat) more and more equally over the infinitudes of Matter and of Space.

Closely connected with, if indeed it be not a necessary part and consequence of, these conceptions of the infinity of Space and Time, of Matter and of Force, is the more general concept of Causation.

It is impossible to conceive of anything happening without a cause. Even if we could conceive the utter destruction or annihilation of any particular force, or form of Force, we cannot conceive of this very destruction happening except as the effect of some cause. All attempts to reduce this idea of Causation to other and lower terms have been worse than futile. They have uniformly left out something which is of the very essence of the idea. The notion of "uniform antecedence" is not equivalent. "Necessary antecedence" is more near the mark. These words do indeed indicate the essential element in the idea with tolerable clearness. But like all other simple fundamental conceptions, the idea of Causation defies analysis. As, however, we cannot dissociate the idea of Causation from the idea of Force or of Energy, it may perhaps be said that the indestructibility or eternal duration of Force is a physical doctrine which gives strength and substance to the metaphysical concept of Causation. Science may discover, and indeed has already discovered, that as regards our application of the idea of cause, and of the correlative idea of effect, to particular cases of sequence, there is often some apparent confusion arising from the fact that the relative positions of cause and effect may be interchangeable, so that A, which at one moment appears as the cause of B, becomes at another *moment the* consequence of B, and not its cause. Thus Heat

is very often the cause of visible Motion, and visible Motion is again the cause of Heat. And so of the whole cycle of Physical Forces, which Sir W. Grove and others have proved to be "correlated"—that is, to be so intimately related that each may in turn produce or pass into all the others. But this does not really obscure or cast any doubt upon the truth of our idea of Causation. On the contrary, that idea is confirmed in receiving a new interpretation, and in the disclosure of physical facts involving the same conception. The necessity of the connection between an effect and its cause receives an unexpected confirmation when it comes to be regarded as simply the necessary passing of an energy which is universal and indestructible from one form of action into another. Heat becomes the cause of Light because it is the same energy working in a special medium. Conversely Light becomes the cause of Heat, because again the same energy passes into another medium and there produces a different effect. And so all the so-called "Correlated Forces" may be interchangeably the cause or the consequence of each other, according to the order of time in which the changes of form are seen. This, however, does not confound, but only illustrates the ineradicable conviction that for all such changes there must be a cause. It may be perfectly true that all these Correlated Forces can be ideally reduced to different "forms of motion;" but Motion itself is inconceivable except as existing in Matter, and as the result of some moving force. Every difference of direction in the motion or in the form of Matter implies a change, and we can conceive no change without a cause—that is to say, apart from the operation of some condition without which that change would not have been.

The same ultimate conceptions, and no other, appear to constitute all the truth that is to be found in a favorite doctrine among the cultivators of physical science—the so-called "Law of Continuity." This phrase is indeed often used with such looseness of meaning that it is extremely difficult to understand the primary signification attached to it. One common definition, or rather one common illustration, of this law is said to be that Nature does nothing suddenly—nothing "per saltum." Of course this can only be accepted under some metaphorical

or transcendental meaning. In Nature there is such a thing as a flash of lightning, and this is generally recognized as sufficiently sudden. A great many other exertions of electric force are of similar rapidity. The action of Chemical Affinity is always rapid, and very often even instantaneous. Yet these are among the most common and the most powerful factors in the mechanism of Nature. They have the most intimate connection with the phenomena of Life, and we know only too well that in these the profoundest changes are often determined in moments of time. For many purposes to which this so-called "Law of Continuity" is often applied in argument no idler dogma was ever invented in the schools. There is a common superstition that this so-called law shuts out the idea of Creation, and negatives the possibility, for example, of the sudden appearance of new Forms of Life. What it does negative, however, is not any appearance which is sudden, but only any appearance which has been unprepared. But these are two very different conceptions, although they are conceptions very easily confounded. Innumerable things may come to be, in a moment—in the twinkling of an eye. But nothing can come to be without a long, even if it be a secret, history. The "Law of Continuity" is, therefore, a phrase of ambiguous meaning; but at the bottom of it there lies the true and invincible conviction that for every change, however sudden—for every "leap," however wide—there has always been a long chain of pre-determining causes, and that even the most tremendous bursts of Energy and the most sudden exhibitions of Force have all been slowly and silently prepared. In this sense the Law of Continuity is nothing but the idea of Causation. It is founded on the necessary duration which we cannot but attribute to the existence of Force, and this appears to be the only truth which the Law of Continuity represents.

When now we consider the place in the whole system of our knowledge which is occupied by these great fundamental conceptions of Time and Space, and of Matter and of Force, and when we consider that we cannot even think of any one of these realities as capable of coming to an end, we may well be assured that, whatever may be the limits of the human Mind, *they* certainly do not prevent us from apprehending Infinity.

On the contrary, it would rather appear that this apprehension is the invariable and necessary result of every investigation of Nature.

It is indeed of the highest importance to observe that some of these conceptions, especially the indestructibility of Matter and of Force, belong to the domain of science. That is to say, the systematic examination of natural phenomena has given them a distinctness and a consistency which they never possessed before. As now accepted and defined, they are the result of direct experiment. And yet, strictly speaking, all that experiment can do is to prove that in all the cases in which either Matter or Force seems to be destroyed, no such destruction has taken place. Here then we have a very limited and imperfect amount of "experience" giving rise to an infinite conception. But it is another of the suggestions of the Agnostic philosophy that this can never be a legitimate result. Nevertheless, it is a fact, that these conceptions have been reached. They are now universally accepted and taught as truths lying at the foundation of every branch of natural science—at once the beginning and the end of every physical investigation. They are not what are ordinarily called "laws." They stand on much higher ground. They stand behind and before every law, whether that word be taken to mean simply an observed order of facts, or some particular force to which that order is due, or some combinations of force for the discharge of function, or some abstract definition of observed phenomena such as the "laws of motion." * All these, though they may be "invariable" so far as we can see, carry with them no character of universal or necessary truth—no conviction that they are and must be true in all places and for all time. There is no existing order —no present combination of Matter or of Force—which we cannot conceive coming to an end. But when that end is come, we cannot conceive but that something must remain,—if it be nothing else than that by which the ending was brought about, or, as it were, the raw materials of the creation which has passed away.

That this conception, when once suggested and clearly ap-

* For the fuller definition of the senses in which "Law" is used, see "Reign of Law," Chap. I.

prehended, cannot be eradicated, is one of the most indisputable facts of instructed consciousness. That no possible amount of mere external observation or experiment can cover the infinitude of the conclusion is also unquestionably true. But if "experience" is to be upheld as in any sense the ground and basis of all our knowledge, it must be understood as embracing that most important of all kinds of experience in the study of Nature—the experience we have of the laws of Mind. It is one of the most certain of those laws, that in proportion as the powers of the understanding are well developed, and are prepared by previous training for the interpretation of natural facts, there is no relation whatever between the time occupied in the observation of phenomena and the breadth or sweep of the conclusions which may be arrived at from them. A single glance, lasting not above a moment may awaken the recognition of truths as wide as the Universe and as everlasting as Time itself. Nay, it has often happened in the history of science that such recognitions of general truths have been reached by no other kind of observation than that of the Mind becoming conscious of its own innate perceptions. Conceptions of this nature have perpetually gone before experiment—have suggested it, guided it,—and have received nothing more than corroboration from it. I do not say that these conceptions have been reached without any process. But the process has been to a large extent as unconscious as that by which we see the light. I do not say they have been reached without "experience," even in that narrow sense in which it means the observation of external things. But the experience has been nothing more than the act of living in the world and of breathing in it, and of looking round upon it. These conceptions have come to Man because he is a Being in harmony with surrounding Nature. The human Mind has opened to them as a bud opens to the sun and air.

So true is this, that when reasons have been given for the conclusions thus arrived at—these reasons have often been quite erroneous. Nothing in the history of Philosophy is more curious than the close correspondence between many ideas enunciated by the ancients as the result of speculation, and some, at least, of the ideas now prevalent as the result of sci-

ence. It is true that the ancients expressed them vaguely, associated them with other conceptions which are wide of the truth, and quoted in support of them illustrations which are often childish. Nevertheless, the fact remains that they had attained to some central truths, however obscured the perception may have been by ignorance of the more precise and accurate analogies by which they can be best explained, and which only the process of observation has revealed. "They had in some way grasped," says Mr. Balfour Stewart,* "the idea of the essential unrest and energy of things. They had also the idea of small particles or atoms; and finally of a medium of some sort, so that they were not wholly ignorant of the most profound and deeply seated of the principles of the material universe." There is but one explanation of this, but it is all-sufficient. It is that the Mind of Man is a part, and one at least of the highest parts, of the System of the Universe —the result of mechanism specially adapted to the purpose of catching and translating into thought the light of truth as embodied in surrounding Nature.

We have seen that the foundations of all conscious reasoning are to be found in certain propositions which we call self-evident,—that is to say, in propositions the truth of which is intuitively perceived. We have seen, too, as a general law affecting all manifestations of Life or Mind, even in its very lowest forms, that instinctive or intuitional perceptions are the expression and the index of other and larger truths which lie entirely beyond the range of the perception or of the intuition which is immediately concerned. This law holds good quite as much of the higher intuitions which are peculiar to Man as of the mere intuitions of sensation which are common to him and to the animals beneath him. The lowest Savage does many things by mere instinct which contain implicitly truths of a very abstract nature—truths of which, as such, he has not the remotest conception, and which in the present undeveloped condition of his faculties it would be impossible to explain to him. Thus, when he goes into the forest to cut a branch fit for being made into a bow, or when he goes to the marsh to cut a reed fit for being made into an arrow, and when in doing so he cuts them

* "Conservation of Energy," p. 135.

of the proper length by measuring them with the bows ar arrows which he already has, in this simple operation he is ac ing on the abstract and most fruitful truth that "things equ to the same thing are equal to one another." This is one the axioms which lie at the basis of all mathematical demo stration. But as a general, universal, and necessary truth th Savage knows nothing of it—as little as he knows of the wo derful consequences to which it will some day lead his childre or descendants. So in like manner when the Savage design as he often does, most ingenious traps for the capture of h prey, and so baits them as to attract the animals he desires t catch, he is counting first on the constancy and uniformity Physical Causation, and, secondly, on the profoundly differer action of the motives which determine the conduct of creature having Life and Will. But of neither of these as general truth does he know anything; and of one of them, at least, not eve the greatest philosophers have reached the full depth or mean ing. Nevertheless, it would be a great error to suppose tha the Savage, because he has no conception of the general trut involved in his conduct, has been guided in that conduct b anything in the nature of chance or accident. His intuition have been right, and have involved so much perception of trut as is necessary to carry him along the little way he requires t travel, because the Mind in which those intuitions lie is a pro uct and a part of Nature—a product and part of that grea System of things which is held together by laws intelligible t Mind—laws which the human mind has been constructed to fe even when it cannot clearly see. Moreover, when these law come to be clearly seen, they are seen only because the Min has Organs adjusted to the perception of them, and because finds in its own mechanism corresponding sequences of though

It was the work of a great German metaphysician toward the close of the last century to discriminate and define mo systematically than had been done before some at least of thos higher elements of thought which, over and above the me perception of external things, the Mind thus contributes out its own structure to the fabric of knowledge. In doing this h did immortal service—proving that when men talked of "e *perience*" being the only source of knowledge, they forgot tha

the whole process of experience presupposes the action of innate laws of thought, without which experience can neither gather its facts nor reach their interpretation. "Experience," as Kant most truly said, is nothing but a "synthesis of Intuitions"—a building up or putting together of conceptions which the access of external Nature finds ready to be awakened in the Mind. The whole of this building process is determined by the Mind's own laws—a process in which even observation of outward fact must take its place according to those principles of arrangement in which alone all explanation of them consists, and out of which any understanding of them is impossible.

And yet this great fact of a large part of our knowledge—and that the most important part—coming to us out of the very furniture and constitution of the Mind itself, has been so expressed and presented in the language of philosophy as rather to undermine than to establish our confidence in the certainty of knowledge. For if the Mind is so spoken of and represented as to suggest the idea of something apart from the general System of Nature, and if its laws of thought are looked upon as "forms" or moulds into which, by some artificial arrangement or by some mechanical necessity, everything from outside must be squeezed and made to fit—then it will naturally occur to us to doubt whether conceptions cut out and manufactured under such conditions can be any trustworthy representation of the truth. Such, unfortunately, has been the mode of representation adopted by many philosophers—and such accordingly has been the result of their teaching. This is the great source of error in every form of the Idealistic philosophy, but it is a source of error which can be perfectly eliminated, leaving untouched and undoubted the large body of truths which has made that philosophy attractive to so many powerful minds. We have only to take care that in expressing those truths we do not use metaphors which are misleading. We have only to remember that we must regard the Mind and the laws of its operation in the light of that most assured truth—the Unity of Nature. Then, indeed, we shall come to see that the Mind has no "moulds" which have not themselves been moulded on the realities of the Universe—no "forms" which it did not receive as a part and a consequence of its Unity with the rest of Na-

ture. Its conceptions are not manufactured; they are deve
oped. They are not made; they simply grow. The order
thought under which the human Mind renders intelligible to i
self all the phenomena of the Universe, is not an order whic
it invents, but an order which it simply feels and sees. An
this "vision and faculty divine" is a necessary consequence
its congenital relations with the whole System of Nature—fro
being bone of its bone, flesh of its flesh—from breathing its a
mosphere, from living in its light, and from having with it
thousand points of contact visible and invisible, more than w
can number or understand.

And yet so subtle are the suggestions of the human Spirit i
disparagement of its own powers—so near and ever present
us is that region which belongs to the unsatisfied Reserve
Power—that the very fact of our knowledge arising out of o
Organic relations with the rest of Nature has been seized upo
as only casting new discredit on all that we seem to kno
Because all our knowledge arises out of these relations, ther
fore, it is said, all our knowledge of things must be itself "re
ative;" and relative knowledge is not knowledge of "things i
themselves." Such is the argument of metaphysicians—an a
gument repeated with singular unanimity by philosophers
almost every school of thought. By some it has been made th
basis of religious proof. By some it has been made the bas
of a reasoned scepticism. By others it has been used simp
to foil attacks upon belief. The real truth is that it is an arg
ment useless for any purpose whatever, because it is not itse
true. The distinction between knowledge of things in their r
lations, and knowledge of things "in themselves," is a distin
tion without a meaning. In metaphysics the assertion that w
can never attain to any knowledge of things "in themselves
does not mean simply that we know things only in a few rel
tions out of many. It does not mean even that there may b
and probably are a great many relations which we have n
faculties enabling us to conceive. All this is quite true, and
most important truth. But the metaphysical distinction is quit
different. It affirms that if we knew things in every one of th
relations that affect them, we should still be no nearer than b
fore to a knowledge of "things in themselves." "It is prop

to observe," says Sir W. Hamilton, "that had we faculties equal in number to all the possible modes of existence, whether of Mind or Matter, still would our knowledge of Mind or Matter be only relative. If material existence could exhibit ten thousand phenomena—if we possessed ten thousand senses to apprehend these ten thousand phenomena of material existence, of existence absolutely and in itself, we should then be as ignorant as we are at present." * The conception here is that there is something to be known about things in which they are not presented as in any relation to anything else. It affirms that there are certain ultimate entities in Nature to which all phenomena are due, and yet which can be thought of as having no relation to these phenomena, or to ourselves, or to any other existence whatever.

Now, as the very idea of knowledge consists in the perception of relations, this affirmation is, in the purest sense of the word, nonsense—that is to say, it is a series of words which have either no meaning at all or a meaning which is self-contradictory. It belongs to the class of propositions which throw just discredit on metaphysics—mere verbal propositions, pretending to deal with conceptions which are no conceptions at all, but empty sounds. The "unconditioned," we are told, "is unthinkable:" but words which are unthinkable had better be also unspeakable, or at least unspoken. It is altogether untrue that we are compelled to believe in the existence of anything which is "unconditioned"—in Matter with no qualities—in Minds with no character—in a God with no attributes. Even the metaphysicians who dwell on this distinction between the Relative and the Unconditioned admit that it is one to which no idea can be attached. Yet, in spite of this admission, they proceed to found many inferences upon it, as if it had an intelligible meaning. Those who have not been accustomed to metaphysical literature could hardly believe the flagrant unreason which is common on this subject. It cannot be better illustrated than by quoting the words in which this favorite doctrine is expressed by Sir William Hamilton. Speaking of our knowledge of Matter he says: "It is a name for something known—for that which appears to us under the forms of exten-

* "Lectures," vol. i. p. 145.

sion, solidity, divisibility, figure, motion, roughness, smoothness, color, heat, cold," etc. "But," he goes on to say, "as these phenomena appear only in conjunction, we are compelled by the constitution of our nature to think them conjoined in and by something; and as they are phenomena, we cannot think them the phenomena of nothing, but must regard them as the properties or qualities of something that is extended, figured, etc. But this something, absolutely and in itself—*i.e.*, considered apart from its phenomena—is to us as Zero. It is only in its qualities, only in its effects, in its relative or phenomenal existence, that it is cognizable or conceivable; and it is only by a law of thought which compels us to think something absolute and unknown, as the basis or condition of the relative and known, that this something obtains a kind of incomprehensible reality to us." The argument here is that because phenomena are and must be the "properties or qualities of something else," therefore we are "compelled to think" of that something as having an existence separable from any relation to its own qualities and properties, and that this something acquires from this reasoning a "kind of incomprehensible reality!" The answer to all this is—there is no such law of thought. There is no such necessity of thinking nonsense as is here alleged. All that we are compelled to think is that the ultimate constitution of Matter, and the ultimate source of its relations to our own Organism, are unknown, and are probably inaccessible to us. But this is a very different conception from that which affirms that if we did know or could know these ultimate truths we should find in them anything standing absolutely alone and unrelated to other existences in the Universe.

It is, however, so important that we should define to ourselves as clearly as we can the nature of the limitations which affect our knowledge, and the real inferences which are to be derived from the consciousness we have of them, that it may be well to examine these dicta of metaphysicians in the light of specific instances. It becomes all the more important to do so when we observe that the language in which these dicta are expressed generally implies that knowledge which is "*only* relative" is less genuine or less absolutely true than

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some other kind of knowledge which is not explained, except that it must be knowledge of that which has no relation to the Mind.

There is a sense (and it is the only sense in which the words have any meaning) in which we are all accustomed to say that we know a thing "in itself," when we have found out, for example, its origin, or its structure, or its chemical composition, as distinguished from its more superficial aspects. If a new substance were offered to us as food, and if we examined its appearance to the eye, and felt its consistency to the touch, and smelt its odor, and finally tasted it, we should then know as much about it as these various senses could tell us. Other senses, or other forms of sensation, might soon add their own several contributions to our knowledge, and we might discover that this substance had deleterious effects upon the human Organism. This would be knowing, perhaps, by far the most important things that are to be known about it. But we should certainly like to know more, and we should probably consider that we had found out what it was "in itself," when we had discovered farther, for example, that it was the fruit of a tree. Chemistry might next inform us of the analysis of the fruit, and might exhibit some alkaloid to which its peculiar properties and its peculiar effects upon the body are due. This, again, we should certainly consider as knowing what it is "in itself." But other questions respecting it would remain behind. How the tree can extract this alkaloid from the inorganic elements of the soil, and how, when so extracted, it should have such and such peculiar effects upon the animal body; these, and similar questions, we may ask, and probably we shall ask in vain. But there is nothing in the inaccessibility of this knowledge to suggest that we are absolutely incapable of understanding the answer if it were explained to us. On the contrary, the disposition we have to put such questions raises a strong presumption that the answer would be one capable of that assimilation by our intellectual nature in which all understanding of anything consists. There is nothing in the series of phenomena which this substance has exhibited to us—nothing in the questions which they raise which can even suggest the idea that all these relations which we have traced, or any others

which may remain behind, are the result of something which can be thought of or conceived as neither a cause nor a consequence—but solitary and unrelated. On the contrary, all that remains unexplained is the nature and cause of its relations—its relations on the one hand to the elements out of which vegetable Vitality has combined it, and its relations on the other hand to the still higher Vitality which it threatens to destroy. Its place in the Unity of Nature is the ultimate object of our search, and this unity is essentially a unity of relations, and of nothing else. That Unity everywhere proclaims the truth that there is nothing in the wide Universe which stands unrelated to the rest.

Let us take another example. Until modern science had established its methods of physical investigation, Light and Sound were known as sensations only. That is to say they were known in terms of the mental impressions which they immediately produce upon us, and in no other terms whatever. There was no proof that in these sensations we had any knowledge "in themselves" of the external agencies which produce them. But now all this is changed. Science has discovered what these two agencies are "in themselves;"—that is to say, it has defined them under aspects which are totally distinct from seeing or hearing, and is able to describe them in terms addressed to wholly different faculties of conception. Both Light and Sound are in the nature of undulatory movements in elastic media—to which undulations our Organs of sight and hearing are respectively adjusted or "attuned." In these Organs, by virtue of that adjustment or attuning, these same undulations are "translated" into the sensations which we know. It thus appears that the facts as described to us in this language of sensation are the true equivalent of the facts as described in the very different language of intellectual analysis. The eye is now understood to be an Apparatus for enabling the Mind instantaneously to appreciate differences of motion which are of almost inconceivable minuteness. The pleasure we derive from the harmonies of color and of sound, although mere sensations, do correctly represent the movement of undulations in a definite order; whilst those other sensations which we

know as discords represent the actual clashing and disorder of interfering waves.

Thus it is that in breathing the healthy air of physical discoveries such as these, although the limitations of our knowledge continually haunt us, we gain nevertheless a triumphant sense of its certainty and of its truth. Not only are the mental impressions which our Organs have been so constructed as to convey, proved to be a true interpretation of external facts, but the conclusions we draw as to their origin and their source, and as to the guarantee we have for the accuracy of our conceptions, are placed on the firmest of all foundations. The mirror into which we look is a true mirror, reflecting accurately and with infinite fineness the realities of Nature. And this great lesson is being repeated in every new discovery, and in every new application of an old one. Every reduction of phenomena to ascertained measures of force; every application of mathematical proof to theoretical conceptions; every detection of identical operations in diverse departments of Nature; every subjection of material agencies to the service of Mankind; every confirmation of knowledge acquired through one sense by the evidence of another;—each and all of these operations add to the verifications of science, confirm our reasonable trust in the faculties we possess, and assure us that the knowledge we acquire by the careful use of these is a real and substantial knowledge of the truth.

If now we examine the kind of knowledge respecting Light and Sound which recent discoveries have revealed to us, as compared with the knowledge which we had of them before these discoveries were made, we shall find that there is an important difference. The knowledge which we had before was the simple and elementary knowledge of Sensation. As compared with that knowledge the new knowledge we have acquired respecting Light and Sound is a knowledge of these things "in themselves." Such is the language in which we should naturally express our sense of that difference, and in so expressing it we should be expressing an important truth. The newer knowledge is a higher knowledge than the older and simpler knowledge which we had before. And why? Wherein does this higher quality of the new knowledge consist? Is it not in the very fact that

the new knowledge is the perception of a higher kind of relation than that which we had perceived before? There is no difference between the two kinds of knowledge in respect to the mere abstract character of relativity. The old was as relative as the new; and the new is as relative as the old. Before the new discoveries, Sound was known to come from sonorous bodies, and Light was known to come from luminous bodies. This was a relation—but a relation of the vaguest and most general kind. As compared with this vague relation, the new relation under which we know them is knowledge of a more definite and of a higher kind. Light and Sound we now know to be words or ideas representing not merely any one thing or any two things, but especially a relation of Adjustment between a number of things. In this Adjustment Light and Sound, as known to Sense, do "in themselves" consist. Sound becomes known to us as the attunement between certain aerial pulsations and the auditory apparatus. Light becomes known to us as a similar or analogous attunement between the ethereal pulsations and the optic apparatus. Sound in this sense is not the aerial waves "in themselves," but in their relation to the ear. Light is not the ethereal undulations "in themselves," but in their relation to the eye. It is only when these come into contact with a pre-arranged machinery that they become what we know and speak of as Light and Sound. This conception, therefore, is found to represent and express a pure relation; and it is a conception higher than the one we had before, not because it is either less or more relative, but because its relativity is to a higher faculty of the intellect or the understanding.

And, indeed, when we come to think of it, we see that all kinds of knowledge must take their place and rank according to this order of precedence. For as all knowledge consists in the establishment of relations between external facts and the various Faculties of the Mind, the highest knowledge must always be that in which such relations are established with those intellectual powers which are of the highest kind. Hence we have a strictly scientific basis of classification for arranging the three great subjects of all human inquiry—the What, the How, and the Why. These are steps in an ascending series. What *things* are—How they come to be—and what Purpose they

serve in the whole system of Nature—these are the questions, each rising above the other, which correspond to the order and the rank of our own faculties in the value and importance of their work.

It is the result of this analysis to establish that, even if it were true that there could be anything in the Universe existing out of relation with other things around it, or if it were conceivable that there could be any knowledge of things as they so exist, it would be not higher knowledge, but infinitely lower knowledge than that which we actually possess. It could at the best be only knowledge of the "What," and that too in the lowest conceivable form—knowledge of the barest, driest, nakedest existence, without value or significance of any kind. And further, it results from the same analysis that the relativity of human knowledge, instead of casting any doubt upon its authenticity, is the very characteristic which guarantees its reality and its truth. It results farther that the depth and completeness of that knowledge depends on the degree in which it brings the facts of Nature into relation with the Faculties which are highest in the scale of Mind.

Nor is this result surprising. It must be so if Man is part of the great System of things in which he lives. It must be so, especially if in being part of it, he is also the highest visible part of it—the product of its "laws" and (as regards his own little corner of the Universe) the consummation of its history.

Neither can there be any doubt as to what are the supreme Faculties of the human Mind. They are the Faculties which are concerned with Purpose—purpose in other minds, and purpose in our own. All others are the instruments and subordinates of these. The power of initiating changes in the Order of Nature, and of shaping them by the highest motives to the noblest ends—this, in general terms, may be said to include or to involve them all. They are based upon the ultimate and irresolvable power of Will, with that measure of freedom which belongs to it; upon the faculty of understanding the use of means to ends, and upon the Moral Sense which recognizes the law of Righteousness, and the ultimate Authority on which it rests. If the Universe or any part of it is ever to be really understood by us—if anything in the nature of an explanation is ever to be

reached concerning the System of things in which we live, these are the perceptive powers to which the information must be given—these are the faculties to which the explanation must be addressed. When we desire to know the nature of things "in themselves," we desire to know the highest of their relations which are conceivable to us: we desire, in the words of Bishop Butler, to know "the Author, the cause, and the end of them." *

* Sermon "On the Ignorance of Man."

CHAPTER V.

ON THE TRUTHFULNESS OF HUMAN KNOWLEDGE.

BUT another nightmare meets us here—another suggestion of hopeless doubt respecting the very possibility of knowledge touching questions such as these. Nay, it is the suggestion of a doubt even more discouraging—for it is a suggestion that these questions may probably be in themselves absurd—assuming the existence of relations among things which do not exist at all—relations indeed of which we have some experience in ourselves, but which have no counterpart in the System of Nature. The suggestion, in short, is not merely that the answer to these questions is inaccessible, but that there is no answer at all. The objection is a fundamental one, and is summed up in the epithet applied to all such inquiries—that they are "Anthropomorphic." They assume Authorship in a personal sense, which is a purely human idea—they assume causation, which is another human idea—and they assume the use of means for the attainment of ends, which also is purely human. It is considered by some persons as a thing in itself absurd that we should thus shape our conceptions of the ruling Power in Nature, or of a Divine Being, upon the conscious knowledge we have of our own nature and attributes. Anthropomorphism is the phrase employed to condemn this method of conception—an opprobrious epithet, as it were, which is attached to every endeavor to bring the higher, attributes of the human Mind into any recognizable relation with the supreme agencies in Nature.

And here it is not unimportant to observe that the word is in itself a misrepresentation of the fundamental idea which it is employed to designate, and against which it is intended to raise a prejudice. Anthropomorphism means literally Man-Formism, conveying the idea that it is, in some sense or other, the human "Form" that is ascribed to the agencies which are at work in

Nature.* But this suggestion is altogether at variance with the truth. It is not the Form of Man that is in question. It is the Mind and Spirit of Man—his Reason, his Intelligence, and his Will. Nor is it even these under all the conditions, or under any of the limitations, with which they are associated in us. But the question is of a real and fundamental analogy, despite all differences of form or of limiting conditions, between the Mind which is in us and the Mind which is in Nature. The true etymological expression for this idea, if we are to have any word constructed on the same model out of Greek, would be, not Anthropomorphism, but Anthropopsychism, which means not Man-Formism, but Man-Soulism. The use of the word in this construction would raise much more truly the real issue. I shall therefore adopt it as a substitute in the argument which follows.

The central idea of those who object to Anthropopsychism seems to be that there is nothing human in Nature, whether as regards its materials, or as regards any agency which controls them, and that when we think we see any such agency there, we are like some foolish Beast wondering at its own shadow. The proposition which is really involved when stated nakedly is this: that there is no Mind in Nature having any relation with, or similitude to, our own, and that all our fancied recognitions of intellectual operations like those of Man in the Order of the Universe are delusive imaginations. If this proposition could be maintained, much indeed would follow from it. All confidence would be lost, not in one department only, but in every department of human thought and of human knowledge. That knowledge would come to us tainted at its very source.

At first sight it might appear as if all reasoning on the truthfulness of human knowledge must be reasoning in a circle. And so it would be if Reason were set to the task of proving

* It has been pointed out to me by my distinguished friend and old tutor, Dr. Howson, the Dean of Chester, that the Greek word μορφή ("Form") had a very wide range of meaning, and that (for example) in the New Testament it is applied to "the form of knowledge and of the truth" (Rom. ii. 20), and to the "form of godliness" (2 Tim. iii. 5), and to spiritual things in other passages. But although this is true, the word "Anthropomorphism" seems to have been introduced in connection with the Greek habit of representing the Divine Personages of their mythology in the physical *form* of Humanity; and it now always conveys a certain flavor of disparagement *from its* association with this materialistic habit and conception.

the trustworthiness of itself. But the trustworthiness of our knowledge does not depend alone on the trustworthiness of our Reason. Our knowledge has other elements in it than the work of Reason. The operations of the Logical Faculty may have our absolute confidence, and yet the results arrived at may be full of doubt. The possibility of this doubt arises not from any distrust of Reason, but from a distrust of the data which are supplied to Reason, and on which it is compelled to perform its appropriate work. That work may be performed with perfect accuracy, and it may be even inconceivable that it should be otherwise, and yet the conclusions to which such reasoning leads may be entirely false. This possibility arises from the possibility of Reason starting with assumptions which are erroneous. The machinery of a loom may be in perfect order, and all its movements may be in accurate adjustment; but if the thread supplied to it is bad, the web will be as unsound as its material. And so it is with the tissue of our knowledge. It is indeed useless to argue that Reason may be trusted. The very argument assumes the trust. But it is by no means useless to argue on the nature and on the sources of the data with which our reasoning is supplied. Now this is the very region in which the doubt of Anthropopsychism prevails, and in which Reason is habitually used to prove that all the data of knowledge are inaccessible. If this be an argument which is capable of defence, it must also be an argument which is open to reply. It is an argument which assumes that Reason can do something in testing the stuff on which it works. And so indeed it can. There is no substance in the material world the strength and texture of which can be tried by methods so sure and so various as the methods by which we can test the conceptions and intimations given to us from our contact with external Nature. The senses of the body, fine and various as they are, do not compare in number or in fineness with the multiform apparatus, and the corresponding multiform operations, by which the Mind can try and verify the impressions of its own Intelligence. It is wonderful from how many independent points of view we can stand, as it were, outside ourselves, and mark those infinite and subtle coincidences between Thought and Fact which establish the Unity existing between

all our Faculties and the great System which it is their business to understand and to interpret. Let us ascend to some of these points of observation now, and let us look around us as we can.

The argument which the word Anthropopsychism involves, if it be an argument,—or the suggestion of doubt, if it be nothing more,—is only another form of the doctrine or of the misgiving with which we have been dealing in the last chapter. It assumes that the relation between the human Mind and the System of Nature in which we live is fundamentally a relation of contrast and not of harmony—a relation of difference so deep and so complete, that the intellectual impressions which Nature gives to us are not presumably right, but, on the contrary, are presumably wrong. The analogies which we see, or think we see, between our own thoughts and the processes or the results of Nature are not real, but false analogies. There are no such things as aims in Nature, and no such things as the employment of means for the attainment of them. The appearance of any such connection is an appearance only. It is a mere human aspect, and therefore a deceptive aspect, of the relation which really exists in Nature between the things which we see as causes and the things which follow as effects. The deceptiveness of this aspect arises out of the very fact that it is human, because what is human is at least non-natural, even if it be not positively unnatural and necessarily false. Man is no part of Nature. His Mind does not reflect her laws. On the contrary, his Intellect is separated by such a gulf from those laws, that it tends of necessity to misinterpret and misconceive them. The very forms in which our perceptions and our conceptions are moulded are forms which have no counterpart outside the Organism through which we see and think.

All this is the same general idea and the same line of argument with which we have been dealing throughout the whole of this Work, and which the facts we have examined have shown to be in every way at variance with the most certain truths. But every form in which this idea can be presented deserves the most patient investigation, both because of the power of the error it involves, and especially because of the subtlety of the suggestions from which it springs. The subtlety of these suggestions lies in the close intermixture of what is true with what

is false. From the beginning of this Essay I have protested against all conceptions of the Unity of Nature which depend on confounding her distinctions, or on concealing them, or in any way failing to give them their fullest value. I have dwelt, also, both here and elsewhere, on the respect we ought to pay in this matter to the evidence afforded by the ordinary use of Language—that great mine and record of intellectual impressions, in which men, very often unconsciously, keep alive the sense and the memory of distinctions which philosophers forget, or which sometimes they intentionally conceal. Now in the profound questions which are before us here, this unconscious evidence of Language has a good deal to say. It cannot be denied that in common speech we do habitually recognize a distinction between Man and Nature. Upon that distinction, whatever it may be, there are some schools of thought which place the highest value. They say—and they say with truth—that we must keep up our perception of real distinctions, if we desire to keep any secure foundation for our perception of true analogies. If we are to recognize anywhere with certainty the phenomena of Mind and Will, we must hold firmly to the distinctions which separate them from the phenomena of mere Physical Causation, and of Mechanical Necessity.

Agreeing altogether in this great fundamental principle of all knowledge, I admit the value of the instinctive perception which is reflected in common speech touching the differences between Man and Nature. But in order to estimate what that value really is, we must observe carefully the whole, and not a part only, of the evidence which common speech affords. We shall then find that in that speech there is an universal recognition of certain aspects of the relation between Man and Nature, in which the distinction between them dissolves and disappears. And these aspects are not rare or abstract, but familiar and continually present. We none of us, for example, ever think or speak of our own bodies as belonging to any other domain than the domain of Nature. Not only in their materials, but in the combination of them—in all the phenomena of birth, and growth—of disease, decay, and death—our bodies are part of Nature and are obedient to her most ordinary laws. The distinction, therefore, between Man and Nature is

confessedly a distinction which must cut Man himself in two. It must separate his body from its functions—his hands from the work which they perform—his brain from the reasoning powers of which it is the Organ and the seat.

Beyond all doubt there is a distinction here, and a profound one, too. But it is no other than the old familiar distinction between Mind and Matter ; and the line which divides Mind from Matter is certainly not coincident with the line which divides Man from Nature. For just as the dividing line between Mind and Matter is a line which cuts Man himself into two parts, so also is it a line which cuts into two parts not Man only, but the whole Natural System of things in which he lives. For that System which we call Nature does not consist only in its body of raw materials and of elementary forces. It consists even more essentially in the arrangement and organization of these for ends which are intelligible as such. The phenomena of Mind are not confined to Man. They are manifested, in the first place, visibly and directly, although in varying degrees, throughout the whole series of living animals. They are manifested, in the second place, as obviously, though less directly, in the innumerable adaptations of which these animals are the most conspicuous examples. The recognition of both these facts in common speech is instinctive, universal, and conclusive. We speak, of course, habitually of the aims of the lower animals, and of their contrivances to attain them ; we speak not less habitually of the far more subtle and elaborate contrivances by which in virtue of their Organization they are themselves enabled first to have these aims, and then to reach them. When, therefore, all these interpretations of Nature, equally common and instinctive, are set aside on the plea that there is not merely a distinction, but an antagonism and a contrast between the Mind of Man and the governing agencies in Nature, it becomes necessary, in the conduct of this argument, to examine wherein the distinction between Man and Nature really lies ; and in no way can this examination be conducted so well as by taking some typical illustrations of the circumstances under which that distinction comes out most broadly, and in which it may have struck us forcibly. I will take some illustrations which require a few words of preface.

Very often when we speak of Nature we are thinking of nothing but the Physical Forces, and of these, too, not in their combinations, but taken separately, and, as it were, by themselves. Now it is quite true that each one of the Physical Forces in Nature, taken by itself, works uniformly and (as it seems to us) of necessity. Under exactly the same circumstances and combinations, they all do exactly the same things. But, on the other hand, it is equally true that in Nature these circumstances and combinations are not uniform nor constant, nor are they of necessity. On the contrary they are conspicuously various and contingent. We can ourselves change them in a variety of ways which is almost infinite, and it is by doing so, and in no other way whatever, that we can ever do anything at all. The look and the aspect of things done in this way is familiar to us. We call them artificial, because we recognize them to be the work of artifice; and in this recognition we rest upon the distinction between these things and other things which seem to be the result of no artifice whatever, but of mere Physical Causation, without any arrangement of conditions, and without any correspondence between preparation and result. For very often the Physical Forces work, or appear to us to work, not under any special combination, but, as it were, alone and by themselves. That is to say, they exhibit their purely natural effects under no particular or evident guidance or co-ordination or control.

Even when these unguided operations are seen ultimately to fit into some great use in the economy of Nature, both the result and the causes of it appear to us to be purely accidental. For example, the distribution of clays, and sands, and gravels, over the surface of the Earth forms an obvious link in the chain of causes which have prepared soils, and fitted them for the support of vegetation, and for cultivation by the hand of Man. But this distribution of various materials over the surface of the Earth has been mainly the blind work of water, acting, as it always must act, under the universal force of gravitation. All gravels are the fragments of former rocks. Some of these fragments have been broken off by frosts, washed down by rains, carried into the beds of streams, and deposited at great distances from their original source. Other fragments have

been carried into the sea, and have been rolled on stormy beaches for unknown periods of time. Now every one of these fragments is a work of Nature; many of them reveal a wonderful history, and are the best evidence we have of great changes in the physical history of the Globe. They differ in almost every locality, with the nature of the rocks around them, and sometimes with the nature of rocks which are hundreds of miles away. For this reason, the composition of gravels is a subject of great interest to geologists, and those who have been accustomed to consider the questions upon which they bear soon acquire a habit of observing them which is almost unconscious.

So it was that many years ago, as I was walking in a garden in the neighborhood of Edinburgh, my eye wandered over the materials which had been freshly scattered on the path. Suddenly, and very unexpectedly, it lighted on a fragment unlike the rest, and unlike them in a way which instantly carried its own explanation on its face. All the other fragments were works of Nature. This one fragment was certainly a work of human Art. It was a very small, but a very perfect arrowhead, made of yellow flint. What was it that made its artificial origin so obvious at a glance? The Physical Forces of Nature, it is true, had made it; but they had made it under special direction and control. The Physical Forces of Nature, working by themselves, under no special direction or control, could never have made that arrowhead. No mere splitting by frost, no mere chipping by accidental collision with other fragments, still less any wearing by rivers or by the sea, could possibly have moulded that perfect symmetry of form, with its sharpened point, with its two lateral barbs, and with the little shank between them. But all this reasoning was an after-thought. In coming to my conclusion, I was not conscious of any reasoning. The recognition was instantaneous. It was the recognition in that fragment, alone of all the fragments round it, of two things which of all others are the most familiar to us. The first of these was the adaptation of material and of form to a known end, and the second of these was that particular mechanical method by which the particular animal Man makes the adaptations he intends.

But now let us separate these two elements in the contrast

between the arrowhead and the other fragments of gravel which lay around it. It was not the mere adaptation of material or of form to a known end which stamped it at a glance as human. It was the particular method by which that adaptation was attained. The mere character of adaptation to a known end—however it may have come about—belongs quite as much to many works of Nature as to the works of Man. In this particular case indeed the surrounding fragments had not this character, but in many other cases closely analogous they might well have had it. For it so happens that in certain gravels of the South of England there are fragments in abundance closely resembling arrowheads, and with the character of special adaptation quite as visibly stamped upon them. These are the fossil teeth of Sharks which swarmed in the seas which deposited the gravels of "The Crag." These teeth are like the arrowhead in being perfectly symmetrical and beautifully sharp and pointed. The special end, too, to which they are adapted is equally the infliction of a wound in the flesh of animals. Both are Implements and nothing else. Moreover, the principal difference between the two forms of Implement can only be explained by the difference between two Intentions. The men who made and who used arrowheads intended the arrow to remain fixed and rankling in the wound it made. The barbs are specially adapted to the fulfilment of this intention. But Nature gives no barbs to the teeth of carnivorous animals, for the very good reason that their method of killing is by a rapid repetition of bites. Any difficulty or impediment in the way of the withdrawal of the teeth from the wound first inflicted would therefore be a hindrance and not a help. It would clearly, therefore, be an obstacle to the intention in this case that the teeth of carnivorous animals should be barbed.

We see, then, that in this case of a close general resemblance between a work of Nature and a work of human Art, both are equally examples of special adaptation, and that the only difference between them by which we recognize the one to be a work of Nature and the other to be a work of Man, is that the one is made by the processes of manufacture, and the other is produced by the processes of growth. In the one case, the purposes of Intention are attained by processes which work

outside of the material which is to be shaped. In the other case, the purposes of a closely similar Intention are reached by processes which work as it were inside of those materials. In the one case, the shaping takes place by hand; in the other case, the shaping takes place by growth.

Now it is perfectly true that in a great part of the domain of Nature the Physical Forces, not only individually, but in their combinations, always appear to us to be worked from the inside; whilst it is equally true that Man can only work and use them from a position which is comparatively external. But in this relative position to the Physical Forces there is, at least, no distinction whatever between Man and other living creatures. No other living creature, indeed, is capable of making an implement like an arrowhead, because no other is capable of forming a deliberate intention so full of knowledge and of foresight. But many of the lower animals do build up and put together natural materials for the attainment of special ends. The nests of birds and of many insects, and the combs of Bees, are among the most familiar examples. How, in ordinary speech, should we classify these? In the common use of language, should we or should we not recognize the distinction between such artificial constructions and the growths of Nature?

Again, I should answer this question by a practical illustration, similar to that which I have employed in the case of the arrowhead. After the lapse of many years I found myself again scanning the gravel at my feet, in a very different scene from a garden in the neighborhood of Edinburgh. It was on the wild banks of the beautiful river which divides the Province of Quebec from the Province of New Brunswick in North America. Among the most striking features of the New World are its noble rivers. The physical geography of Europe cannot afford the same rush of waters as the immense "catch-basins" of the American Continent. Even the smaller streams of the Canadian Dominion partake of the same character of sweep and of abundance. The Restigouche is one of these. It falls into the head of the Bay of Chaleur, after running in a deep glen through many miles of forest hills. These *hills are* generally very steep; and the soil is comparatively

poor, so that there are few agricultural settlers, and their farms are often widely separated. During a fishing excursion on that river in the month of July, 1879, I landed from a canoe not far from the junction of a large tributary, the Patapediac. All Canadian rivers bear more or less driftwood down their course, and on some of them, at points which favor the accumulation of it, there are sometimes thousands of tons heaped upon each other in impressive and picturesque confusion. At the point at which I landed there was nothing of the sort. On the contrary, the shore was remarkably clean, the natural gravel being smoothed and compacted by the annual passage of the ice in spring. But I soon came upon one little bit of driftwood lying among the stones, and something peculiar in its appearance at once attracted my attention. It was, like others of its kind, well worn, and both ends were well rounded. On lifting it, I saw in a moment that it had not been broken by wind from its parent tree. There were no straggling points,—no torn fibres,—no look of mere accident about it. At both ends it had been definitely cut, although the cut surfaces had been subsequently more or less smoothed by rubbing against the stones. On the other hand, nothing in its appearance suggested the work of a woodman's axe. On a closer examination the mystery was solved at once. Two deep incisions, as if made by two powerful chisels working together and parallel to each other, revealed the fact that this bit of wood had been cut and prepared by that curious animal to which, more than to any other, has been given an instinct and a habit of constructive purpose which resembles those of Man. It flashed upon me in a moment that I was holding in my hand one of the bricks, as it were, used in the building of a Beaver's dam, or possibly one of the loaves which are stored for winter's food.

Was this or was it not a work of Nature? Certainly not—in at least one ordinary meaning of the word. It was because of the distinction between it and the mere work of the winds and of the waters and of the stones that I noticed it as peculiar. It was because of this distinction that I then thought of it, and now write of it, as a thing of higher interest than a mere bit of the tangled driftwood of the Restigouche. But if any one should hesitate upon this point, namely, as to whether things

fashioned and shaped by the lower animals do or do not com under the category of "works of Nature," then this very doub or hesitation is itself significant. It shows that there are poin of contact between the two categories so close that we ca hardly say to which of them certain things belong. It show that the distinction is one of degrees, and that there are depar ments, as it were, in Nature so much higher than others, th they seem to rise above the level of her physical domain.

And this aspect of the matter in question will grow upon t the more closely we regard it. For whatever doubt we ma have as to the classification we should assign to the stick whic the Beaver had prepared, we can have no doubt whatever as t the classification we should assign to the Implement by whic the Beaver had prepared it. These two deep incisions b which it had been cut were the marks of the tools which ha been employed. Those tools were the Beaver's teeth. Bu these teeth are, beyond all question, works of Nature. I themselves they are nothing more than specially adapted form of the four front teeth, two in each jaw, which are common t the great group of animals constituting the Order "Rodentia in the Mammalian Class. The Beaver has indeed another Im plement also adapted to the special purpose of dam-buildin which is altogether peculiar to itself, and that is a flattened tai which in its peculiar movements and powerful muscles is unlik the tail of any other rodent, or indeed of any other anima The whole is an apparatus enabling the tail to be used wit great force as a trowel for beating mud into the interstices o the timber, and for thus giving to the structure sufficient soli ity and coherence to arrest and resist the flow of running wate This Implement of the tail is an unusually special adaptation t the end of dam-building, because it is more exceptional in it structure, being indeed absolutely unique in the organization o the Mammalia. And so the finished dam, even more than th single stick used in its construction, shows us that there is gradual passage from things which beyond all doubt we shoul call works of Nature to other things which as certainly w should recognize as works of Art.

And when this passage has been traced in the works of th lower animals, we recognize it as a passage which is not less ol

vious in the works of Man. The hand of a man we call a work of Nature, but the products of that hand we call works of Art. Yet it is needless to say that there is an indissoluble unity between the two. Just as the teeth and the tail and the whole physical structure and the mental instincts of a Beaver are harmonious members of a series leading up to engineering works of great strength and skill, so the hand of Man is the one great implement which is co-operant with a brain of indefinitely greater constructive ingenuity. In both cases the Organic Implements are classed as works of Nature. In both cases the works which they construct are classed as works of Art. And so the principle of the distinction which is unconsciously reflected in common speech is a principle which we can trace to its source. All living things are in themselves works of Nature, whilst all the works which they by their structure, and by their corresponding instincts, are enabled to execute are, in their measure and degree, works of Art.

There is, in this distinction, as there generally is in the distinctions of common speech, a profound philosophy. Between the adapted structure of all living creatures and those other adapted structures which these creatures have been fitted and formed to make, there is indeed no break of continuity, but there is the introduction of an intervening Personality,—of a living Will, however narrow its bounds,—of a derived and delegated power to do afresh, in small measures and degrees, that same kind of work which, in much larger measures and degrees, has been done for them in their own structure, and for their own existence and enjoyment. These works of living creatures are thus, as it were, works of Nature done by commission and at second-hand. A great distinction this, no doubt,—and all the greater in proportion as the delegation is less restricted and the commission is wider in the powers conferred; but it is a distinction which is obviously subordinate, and lies wholly inside the larger definition which we must give to Nature when we consider how absolutely all the powers wielded by the Personality of all living creatures are delegated powers, given in and through adapted structures. Moreover, when we look at the infinite gradations under which Personality is constituted among living creatures, and how various are the degrees of free-

dom and of originating power which have been given to ther we must see that in this respect there is no distinction betwee the highest and the lowest. In this respect, I say—meaning t these words to specify the one characteristic of delegation, an not meaning to deny a vast difference in the gifts and powe which by virtue of that delegation are conveyed.

Here is the confusion which exists in many minds. The fear that if their powers of thought and of contrivance are r ferred to that Organization which is undoubtedly the work Nature, these powers must be degraded into mere functions organic or mechanical necessity. But the character of deleg tion does not in itself necessarily imply anything of the kin Two men may be equally the agents of another, although th one is bound down by precise and imperative instruction whilst the other is intrusted with a wide and a free discretio And so it is with that great army of living creatures which a all equally the births of Nature, but which hold innumerabl ranks and commissions in her service. The work of some them is menial, almost mechanical, and more or less unco scious. The work of others partakes in an ascending order degrees of a larger and a larger share of Intelligence and Will. Man is separated from all others by a great gulf in th measure in which he partakes of these. Nor will it make an difference in the argument if the mental gifts of Man are r garded as so immeasurably superior as to be "different in kind. This is a question of definition; and although I know of n definition of Intelligence or of Will which does not include th lowest manifestations as well as the highest, yet it is unque tionably true that between the two ends of the scale there is distance and a space which is, as it were, infinity. In Man ne elements are added to those which are manifested in the lowe animals, and these new elements make him almost as a God t them. But he cannot be as a God to himself; for if he sees gulf below him, he is only too painfully aware that there is much wider gulf above him. We may separate as widely as w please between Man and the Beasts; but in the general fac that in all his great powers and in his wide extent of freedor he is the creature and the child of the Natural System in whic he lives, there is no difference at all.

It results from this analysis that if Man is to be considered as separate from Nature because of the external relation in which, under certain aspects, he stands to the Physical Forces, and because of the necessity he is under in all his works of acting upon them "from the outside," then the whole vast series of the lower animals must be considered as also separate from Nature, because of their like position, and because of the same necessity under which they lie. They all partake of that individuality—of that separateness and of that voluntary power—in which Personality consists. Within some little area, however small, they are all free, and they all do whatever they may have to do by acting "from outside" on the materials and on the forces of the world around them. Moreover, it results from this analysis that as Man and all other living beings are separate from Nature in this one aspect of their relations to her, so they are all equally united to, and form part of, Nature in that other aspect—far more intimate—which concerns their own physical Organization. For that Organization is a growth and not a manufacture. It is the work of the Physical Forces under the combinations which are effected by that particular agency which we know as Life. It is a further result of this analysis to show that in respect to the evidence of Intention there is an absolute unity—a perfect continuity—between the structure of every Organism and its works or doings. It can only make or do what the Apparatus given to it fits it and enables it to do. It is certain, therefore, that the same interpretation which applies to the work must apply to the Apparatus by which the work is done. If the human or anthropopsychic interpretation of the works and actions of all living Beings is the only interpretation which explains them, it must be the only interpretation which explains the adapted structures through which these works and actions are performed. The reasoning must be false which admits the evidence of Will and Purpose in the comparatively limited degree in which these attributes are exhibited in the actions of the lower animals, whilst it denies them in the much larger degree in which they are exhibited in the fashioning of the tools with which they are supplied. If the anthropopsychic explanation of a Beaver's dam is the only explanation which would be tolerated by common

sense, it is not less certainly the only explanation which can be satisfactory of the Beaver's teeth and of the Beaver's tail.

And if there be ever any difficulty in accepting this conclusion because of the apparent difference between the methods by which Man attains his ends and the methods by which like ends are attained in Nature, let us consider well in what that difference consists. Man—it is often said—works his Will in Nature, in so far as he can work it at all, by acting upon the chain of Physical Causation "from the outside." In Nature no one can be seen working in a like position. Everything seems to us to be done from inside that chain, by action which not only appears to be automatic, but to be self-originated and self-sustained. But can we not see how slippery are the foundations on which this distinction rests? We must feel and know how ignorant we are of the ultimate constitution of things, and especially of the ultimate relations of Mind and Matter. Moreover, we must feel and know that this is precisely the region of thought in which the anthropopsychic objection suggests itself. What accurate conception can we really form of that which is "outside" of the Physical Forces and that which is "inside" of them? Yet this is the main distinction which strikes us between a growth and a manufacture—between the adapted structures of which Nature is so full and those other adapted structures which are made by ourselves and by other living creatures.

Are we quite sure that this contrast of relative place between the agencies of Mind and the Forces of Matter is a real contrast in the nature of things, or a contrast which is apparent only? May not our notions of what is outside and of what is inside of Nature be liable to the same kind of error which used formerly to affect our notions of downwardness and upwardness of direction on our own Globe? No apparent distinction was once more fundamental in physics, and none interposed a greater obstacle in the way of accepting and understanding the real constitution of the Universe. How could there be an Antipodes where men and animals would hang with their heads downwards? But this difficulty was cleared up when men came to understand that there is no such distinction as "downwardness" and "upwardness" in absolute Space, and that although our

perception of this distinction is not at all false or deceptive when it is properly understood, but, on the contrary, is perfectly true in its own limited sphere, it is the perception of a truth which is local, as it were, and relative, and does not stand in any contradiction whatever with the higher truths which affirmed that a habitable Antipodes was possible, because the same absolute direction which is upwards on one side of the Globe would be downwards upon the other. It is perfectly true that downwardness is a fact of consciousness to us; but it depends upon the direction in which the force of gravitation is felt as exerting its greatest energy upon our bodies. In like manner the outwardness of our own mental relation to the Physical Forces over which we exercise some control is a fact of consciousness, and so likewise is our own impression as to the apparent inwardness of the agencies which work in Nature. But this contrast is one which may well be apparent only, and may be the mere result of the invisibility of the forces by which the motions of Matter are effected. The truth is, that when we come to think of it, we never do believe that the visible motions of Matter which appear to be spontaneous and self-determined, can be so in reality. We always conceive of these motions as due to some "force" acting outside the matter which is moved. Our idea of Causality always does, and always must, go behind and beyond the Visible and so we can readily understand how it is that the Physical Forces must of necessity seem to us to be working "by themselves," when in reality they may be working under a strict control.

Two circumstances in our own experience may help us better to understand how all difficulty on this subject may easily arise from exclusive attention to partial aspects of the truth. One of these circumstances is this—that in our own bodily Organism the two apparently contradictory aspects of the relationship of Mind to Matter are both present, and are both continually observed. The passage from movements which are wholly internal and automatic to other movements over which the Mind has usually an outward and complete control, is a passage of insensible gradations. The second of these circumstances is this, that the most ingenious of all human machines—those in which Mind is most present and most triumphant—are pre-

cisely those in which the Physical Forces have most the appearance of acting by their own internal energies, and by nothing else. Almost all the machines which are employed in the service of civilized life, even the most simple, when first seen by Savages, are supposed by them to be living creatures, because, in their own limited experience, they have no conception of mental purpose, intention, or contrivance reaching so far by means of mere external action upon the natural forces. It never occurs to them that it may be all done by acting upon those forces precisely as they themselves act upon them in the shaping of a spear or in the aiming of an arrow. They conclude, therefore, that the action of the machine is analogous to that other kind of action with which they are even more familiar, and which does much more complicated things, namely, the kind of action by which they move their own bodily Organs. This kind of action is from a source which is inward, and constitutes the special power of a living Personality.

Now we can very well understand that in respect to our knowledge of and resource over Nature we are all comparatively in the position of children or of Savages, and our conclusions as to the limits of mental action upon Matter, or of the relative place in which Mind may take its stand in causing the subject movements of Material Force, we may very easily be liable to the same delusions. Limited as our knowledge and resources are, it is nevertheless wonderful what we ourselves can make the Physical Forces do in the way of representing, fulfilling, and embodying the purposes of Mind. It may sound strange, but it is nevertheless strictly true, that we can and do make machines with the power and the faculty of self-control. There is a well-known part of the steam-engine which is called the "governor." It is what its name implies. When the energy of the steam is excessive for its intended work, it is the function of the "governor" to restrain and limit the supply of that energy to every part of the machine, and amongst others to itself. With a sensitiveness as delicate as that of any living thing, and with an instantaneousness of action which exceeds that of the most resolute and wakeful Will, this function of watchfulness and restraint is perfectly discharged. To all outward appearance, and in a certain sense in reality and in truth,

this action has its origin inside the machine. A mode of action which is essentially variable and contingent is yet due to rigid Physical Causation, and has all the appearance of being part of the chain of cause and effect which men speak of as fixed and unalterable. This variable action arises as a necessary consequence out of those invariable laws of motion, to which "centrifugal force" is due. And yet all this appearance of inwardness and of spontaneousness in the action of the governor of a steam-engine is—not false indeed, but—a partial and imperfect aspect of the truth. In reality it is the work of Mind. In reality its source lies outside the chain of Physical Causation, —in that power which stands behind it and above it, and which uses the rigidity and uniformity of the Physical Forces as the instrument of its own varying intentions.

This is an example which enables us to understand how widely, and indeed how universally, and yet how secretly and invisibly, the same principle may prevail in the System of Nature. In all its mechanism those actions which appear to us to be automatic may well be so only in the same sense. They work "of themselves;" but then they can work as they do only because those "selves" are adjusted to do certain things. There are many automatic movements in our own bodies which are a perfect illustration of this principle—such, for example, as the Apparatus which watches against the introduction of food into the wrong passage of the throat, and shuts it off, or coughs it out, by sensitive and convulsive actions which are entirely beyond the control of the Will. All these automatic movements and all the Apparatus by which they are effected are the work of Nature, as distinguished from the work of Man; and yet they all may be equally effected by some action originating outside the chain of mere Physical Causation. The immediate adequacy of that causation to produce mechanically the observed effects has nothing to do with the question. In both the instances which I have just cited that adequacy can be perfectly traced and explained. In the one case—that of the governor in a steam-engine, the flying apart of two whirling balls is made by connecting rods to lift a valve, and the more violently the balls are whirled by any excess of steam, the more they fly asunder, and consequently the more they lift the rods and close the valve.

In the other case, that of the Apparatus for protecting the windpipe, a nerve of extreme sensitiveness and irritability is spread over a particular muscular surface, and the contact or passage of any foreign body at once produces automatically a violent and convulsive contraction. In like manner and in close proximity there is another similar Apparatus with an exactly opposite purpose—an Apparatus which, instead of rejecting foreign matter, is, on the contrary, made to seize it and force it down the passage which it ought to take. But all these chains of Physical Causation are made into "chains" by links which are joined, not by necessity or by accident, but by Adjustment for the discharge of a particular function. In neither case is the Physical Causation intelligible without reference to the special end to which it is directed.

And here we come upon a doctrine or abstract proposition which, like the elementary propositions of Euclid, bears upon the face of it all the characters of an axiomatic truth. Strange to say, it is often quoted now as a stronghold of Materialistic philosophy, and as establishing the all-sufficiency of purely mechanical explanations. That doctrine is this—that the foundation of all science is confidence in the Intelligibility of Nature.* And never was there any axiom with a richer meaning,—never any with wider or more searching developments of truth. It is an axiom which asserts that the system of Nature is in close correspondence with the Intelligence of Man. But this correspondence must be with the whole of Man's Intelligence, and not with a bit of it only. Those who try to restrict it to a part of our Intelligence, and that part certainly not the highest part, are not reasoning in consistency with the axiom, but in defiance of it. They are taking its name in vain. The doctrine of the Intelligibility of Nature demands that this Intelligibility should be coextensive with the whole range of Man's Intelligence, and must embrace especially the higher faculties as well as the lower. Those which perceive the reason of things must be included as well as those which perceive their causes merely. This is the scientific basis on which we can affirm with certainty that the anthropopsychic *view* of phenomena, when duly understood and limited, is at

* Lange's "Hist. of Materialism." Transla. vol. iii. p. 20.

least one most just and necessary aspect of the truth. If the Intelligibility of Nature demands that we should trust our mechanical faculties when they recognize the relation between completed structure and actual performance, it demands not less clearly that we should trust those other intellectual faculties which recognize the relation between the preparation of that structure, and some foresight of its work. In the System of Nature there is no break of continuity between these two. There is a perfect passage and a perfect unity.

The assertion is often made, but is quite unfounded, that the explanations which consist in the perception of Purpose are obliged to fly to the dark places of Nature, where mechanical explanations have not yet been, or may never be discovered. The contrary is the truth. Nowhere does the light of Purpose shine more clearly to our Intelligence than in those adaptations of Nature in which her machinery and her means have been most perfectly explored. In some cases it is the extreme simplicity, in other cases it is the extreme complexity, of the means employed which most strikes us with wonder and admiration. But in no case does our perception of mechanical causes obliterate or supersede our perception of the aims to which these causes have been made subordinate. These two perceptions are not antagonistic, but complementary. Neither is complete without the other. But of the two, our perception of aims is perhaps the best able to stand alone. The most perfect ascertainment of mechanical cause, the clearest explanations of animal structure and of Apparatus which are attainable by us, must necessarily be incomplete, even in the purely mechanical point of view, because they leave untouched the mystery attaching to the special combinations of elementary substances and of elementary forces out of which all such structures are built and by means of which all their appropriate mechanical effects are reached. But when our Intelligence has once recognized in any natural action the discharge of a particular function and the adaptation of means to a definite end, it is able to repose upon that perception as affording full and adequate satisfaction to some at least of the highest of our mental faculties. It is true, indeed, that this perception does not attain the rank of *an ultimate* truth, for the simple reason that, high

as the faculties are which recognize the reason of a thing, there are other faculties higher still, which seek to know where that Reason—that Logos—is seated, and what is the place of its habitation. This, however, is a question belonging to another category. It passes into the region of Theology. But the impossibility of answering it by the methods of mere physical research does not imply the smallest doubt in the truthfulness of those perceptions which in the course of that research see and recognize the Reasonableness of Nature. The doctrine of the Intelligibility of Nature does indeed guarantee the correspondence of our faculties with her operations so far as those faculties carry us. But it does not affirm that our Intelligence is co-extensive with the whole domain of knowledge. We may be absolutely sure that we are right when our Reason recognizes another Reason in the machinery of Nature, although we may be wholly unable to discover more than a few of the conditions under which that Reason works.

It is here that the deceptions of a really false and spurious Anthropomorphism—properly so called—begin to work. Mind in ourselves is inseparately connected with organized Matter, and especially with a Brain. Of the nature of this connection we really know nothing. All the attempts to explain it, or even to express it, are empty words. But the inference or conclusion that Mind cannot exist, or cannot be recognized, except when seated in a Brain, is evidently the rudest and coarsest conception in which Anthropomorphism could possibly be embodied.* It is erecting the Form of Man into a necessity of thought. It is assuming that Form to be the only form through which thought can be exerted, or in which Mind can exist. Even if we could see no obvious absurdity in such an idea, it would still be unsupported by any reasonable argument. But we can see very clearly at least one consideration which suggests that this idea not only may possibly be absurd, but is probably absurd, from facts and considerations which are perfectly accessible to our Intelligence. One of these facts is this—that the Brain itself has all the characters of a machine constructed for a purpose. Its elaborate mechanism—unexhausted and apparently unex-

* "Science knows only one kind of Mind, that is, human."—Lange, "History of Materialism," vol. iii. p. 73.

haustible to us in the subtlety and complexity of its structure,—with its ramifications of nervine tissues permeating every portion of the body, and constituting the very essence of every special Organ,—some of them being the channels of all receptive, and others the channels of all reactive powers,—this wonderful mechanism is visibly to our Intelligence an Organ—an Apparatus. Now we can perfectly understand the possibility of machines which are in a sense self-acting, and, within certain limits, self-regulating. But we cannot conceive any machine which, in the fullest sense of the word, is self-made and self-originated. The Intelligibility of Nature negatives this idea as nonsense and self-contradiction. It demands, therefore, that an Apparatus should be regarded as a result of preparation, and it demands farther that the agency which prepares cannot be the same as the product which is prepared. The Brain, therefore, instead of appearing to our Intelligence as the only conceivable seat and shrine of Mind, is recognized by Reason as an Apparatus prepared by Mind for the play and exhibition of some little loan or emanation from itself with a definite and prescribed sphere of Perception and of Thought. It is, as it were, a little pool drawn from an illimitable Ocean, and so set round and girdled by containing walls as to reflect only its own little prospect of the world, and its own little patch of sky. Here, as elsewhere,—here in this most secret arcanum of Nature,—we perceive that same outsidedness of Mind in its relation to Matter of which we seem to be conscious in the operations of our own Intelligence when it works out its own resolves and makes the elements and the Forces of Nature subject to them.

It appears, then, that, on close examination, the one great distinction which is sometimes supposed to separate fundamentally between the mechanisms of Nature and the mechanisms of Man—namely, that Man acts from "outside the chain of cause and effect," whilst Nature works from "inside" that chain—is a distinction which vanishes away. The Apparatuses of Nature do not even seem to us to be self-constructed, and our instinctive sense of the Intelligibility of Nature renders it impossible that we should so regard them. The constructive Agency, wherever its *ultimate* seat may be, is certainly and almost visi-

bly outside the materials with which it works. The only difference is this—that whereas we are ourselves conscious of standing outside the chain of mere Physical Causation in a very limited sense and in a very limited degree, the constructive Agency in Nature seems to stand outside and above it in a measure and degree which is unattainable to us.

And here it is most significant to observe, that the progress of physical research, instead of tending to obliterate or to narrow, is tending, on the contrary, to broaden and deepen the distinction between the bare Elements of Matter or the Physical Forces of Nature and the complicated structures which have been erected out of them. In all departments of science the power and dominance of abstract conceptions in the interpretations of Nature has become so much more and more conspicuous that it is daily found more and more profitable to explain, and more and more possible to predict, the most elaborate series of phenomena by the processes of arithmetical calculation, and of mathematical analysis. And where mathematical explanations fail, there other mental conceptions of a still higher order step in, and are ever carrying us to loftier and loftier summits in the Intelligibility of Nature. Above all others, perhaps, the science of Chemistry has made discoveries—corroborated more and more by investigations purely physical—which have cast an entirely new light on the ultimate constitution of material things. Let us look for a little on what this light is and in what its novelty consists.

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CHAPTER VI.

ON THE ELEMENTARY CONSTITUTION OF MATTER IN RELATION TO THE INORGANIC.

THE Materialistic Philosophers of the ancient world had reached by purely speculative thought some conceptions as to the constitution of Matter which have a curious likeness to the conceptions of modern science. It would be wrong to say that this likeness is superficial. The correspondence between ideas reached in early ages by abstract reasoning or by intuitive perception, and ideas reached in modern times as the result of physical research, is one of the most instructive incidents in the history of human thought. It is a correspondence pointing unmistakably to the close consanguinity of the Mind of Man with the whole System of External Nature, and to the consequent fidelity of its general impressions when it looks into that System with scarcely any other apparatus than its own thoughtful and inquiring gaze. It is thus that the early Greek philosophers had conceived the idea of Atoms as the ultimate particles of Matter, and they were full of curious imaginations as to the important, and indeed the fundamental part which they played in the constitution of the Universe. We know that a similar idea, or at least an idea which finds its best expression in the same word, lies at the very root of the conceptions which have been reached by modern science. But modern science has discovered the inseparable connection between this idea of Atoms and other physical conceptions of which the Ancients knew nothing. They had an idea indeed of Matter consisting of ultimate particles, and they had an idea, too, that these particles were not so much indivisible as practically undivided. Their acute and subtle intellects could not fail to see that an Atom, in the strictest sense of the word, is inconceivable. Everything which has any extension, however small, must be conceived as divisible. They saw, therefore, that the ultimate Atoms of which Matter

consists can only be ultimate, not because they can be absolutely indivisible, but because as a fact they never are divided.

There is a wonderful and instructive coincidence here between ideas based upon the research of outward things, and the older ideas based upon the search of the human Spirit into its own conceptions. But the search into outward things has carried us farther now—into new and more wonderful regions of speculation and of thought. In the idea of an Atom—divisible indeed, but never divided—breakable, but never broken—the Ancients had got hold of an idea, which gave them the unit of mechanical aggregation. It gave them, as it were, the bricks or the prepared stones out of which the edifices of Nature have been reared. But it gave them nothing more. It gave them no conception of the building process. It gave them no conception how the bricks and stones could be put together—some to serve the purpose of foundations, others to serve the purpose of walls and of chambers,—and of passages of communication, —and of batteries of force,—and of centres of energy,—whilst others again are made to range themselves in ever-varying lines of ornament and of beauty.

I do not say that modern science has explained this fully. Very far from it. But it has explained it in a measure and degree by the discovery of agencies, of forces, and of energies determining the movements of Atoms, of which the ancient philosophers had not even the most distant dream. They knew—indeed they could not help knowing—something of the idea of Force as it is exerted in the human body, and also as it is exerted among dead things in the phenomena of Weight. But these were the only forces, the only sources of energy, of which they had any notion; and even as regards the phenomena of Weight, they had no idea of the mystery which attaches to the Force which we now know as the Force of Gravitation. Perhaps even in the present day we do not sufficiently estimate that mystery. The sense of Weight in ourselves, and the universality of its effects on the things around us, make it so familiar that we are apt to regard it as a thing of course, and as needing no explanation whatever. And yet the physical causes *of Gravitation* are absolutely unknown. Why and how it is *that the* particles of Matter are drawn or impelled towards each

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other in direct proportion to each other's mass, and in a definite inverse proportion to the distance from each other, is quite inexplicable in the present state of our knowledge. Attraction is almost certainly not what it appears to us to be. "Action at a distance" is not really conceivable; so that when two distant bodies seem to exert any influence on each other, the effect must be really due to some intervening medium by which they are pushed or pulled. But assuming the mutual attraction of all the particles of Matter as the provisional expression of an ultimate fact, it goes but a very little way indeed towards explaining the constitution of Nature as we see it. The ancient Materialists made as much of it as they could. They conceived the existing Order of Nature to have been evolved out of the mere clash of Atoms. And no doubt the mutual attraction of the particles of Matter under the Force of Gravitation may account for the condensation—that is to say, for the mere aggregation of them. It may indeed account for a great deal more, because it is possible that all the energies of Heat and Light may be due to Gravitation. Various hypotheses involving this idea have appeared from time to time; and nearly thirty years ago Sir W. Thomson lent the high authority of his name to a theory in which Gravitation was made to account for all the Light, Heat, and Motions of the Universe. But this is a conception far beyond the knowledge of the Ancients. They simply generalized from the ordinary phenomena of Force and Weight. The idea of motion is of course involved and presupposed, and the further idea of eccentric clashing among the Atoms leads to the conception of movements in circles, in ellipses, or in vortices.

These conceptions supply almost the whole furniture of the old Materialism; and it is a curious fact that there is a distinct tendency in modern Materialism to lower and impoverish the language of science down to the level of that pre-scientific age. Even those who have no tendency to theoretical Materialism are very apt to adopt language which reproduces nothing but the crude conceptions of the Lucretian philosophy. Thus it has become almost a cant expression amongst writers on physics and on physiology to ascribe every property exhibited in Matter, whether that Matter be dead or whether it be connected

with vitality, to what they call its "molecular constitution." Now the word "Molecule" has been appropriated by general agreement among chemists and physicists to those particles of Matter which are the units of cohesion or of mechanical aggregation, as distinguished from the Atom which is the unit of chemical combination. The Molecule is a group of Atoms so united that no mechanical force can shake them loose. All the mechanical forces, therefore, find the Molecule to be an indivisible Unit, and can only deal with it as such. Chemical Force alone can get at the Atom. No other force can sunder the combinations into which it enters. A compound substance may undergo the most violent changes—it may be ground to dust, it may be melted into liquid, it may be dissipated into gas, and yet its molecular group of Atoms will remain intact. The Molecule of a compound substance, however changed in form, is still the same compound of the same elementary Atoms which constituted the substance before its change. Thus the Molecule of water, when driven by heat into the form of steam, is as much a chemical compound of oxygen and hydrogen as it was when it cohered with other molecules more closely in the liquid form, or less closely in the solid form of ice. On the other hand the Molecule of an elementary substance and the unit of its mechanical aggregation, may be either a little group of its own Atoms, or it may be these Atoms single and alone. It will be seen, then, that the phrase "molecular constitution" is a phrase which essentially expresses, and always suggests, the idea of mere cohesion, or of mere mechanical aggregation, and of nothing else.

When, therefore, the profoundest distinctions which exist in Nature, as, for instance, the distinction between a Germ that is to develop into a Reptile or a Bird, and the Germ which is to develop into a Man—when this distinction is spoken of as depending on the "molecular constitution" of the two Germs, the phrase either means nothing, and becomes a mere formula for concealing ignorance, or else it is a phrase which means that the most diverse issues of Organization and of Life depend on nothing else than differences of mechanical arrangement in the ultimate particles of Matter. Now although science is helpless to explain all that we desire to know in

these deep questions, it has taught us quite enough to enable us to see that the explanation suggested in this kind of language is certainly untrue. We can see, and we can be absolutely sure, that not only the mere aggregation, but even the orderly arrangement of the ultimate particles of Matter, is not the cause, but the consequence and effect, of the energies which work in chemical and in vital phenomena. It is not only a rude and coarse conception, but we are now entitled to say that it is an ignorant conception of the System of material things, that it consists essentially in mere aggregation or in movements arising out of the accidents of mechanical collision. It was not a very rational conception even in the ages when the human mind had little to go upon beyond the vague impressions it derived from a very few obvious facts. But in these days, when a whole world of new and wonderful discoveries has been opened to our view in respect to the nature and properties of material Atoms, it is not too much to say that any return to this conception now is a return to the beggarly elements of an exploded superstition.

The Atom of modern chemical science is a very different thing from the Atom of ancient speculation. Both in itself and in the powers with which it is invested in its relation to other things, the Atom of science is a new conception. In itself it is no longer an ultimate particle merely because there is no agency capable of dividing it. Its relation to Matter is no longer like that of a grain of sand, or of a mote of dust, to the rock or to the stuff from which it has been derived. All these are as it were accidental products, having neither form, nor size, nor weight which is constant or invariable. But it is the cardinal idea of the new conception that the Atom of each elementarys ubstance is, as it were, and as Sir J. Herschel has called it, a "manufactured article,"—that is to say, that it has properties which are not necessary, but contingent and artificial. In particular it is absolutely uniform in size and weight. This absolute identity and uniformity obtains in every elementary Atom, not only in this world but in all the most distant worlds of space. The Atom of hydrogen, for example, seems to have absolutely the same properties whether it is seen in the light of the great stars Sirius and Arcturus or in the de-

composition of water on our own Globe. In both places th molecule of hydrogen executes its vibrations in precisely th same time. That the sciences of Physics and of Chemistr confirm each other in asserting the absolute unity and uni formity of the Atom. We have no knowledge of any natura process by which such absolute Units of Mass with identity o properties can be produced. Professor Clerk Maxwell, speak ing of these facts, and following up the opinion embodied i the dictum of Sir John Herschel, has declared that "eacl molecule throughout the Universe bears impressed upon it th stamp of a Metric System as distinctly as does the metre o the Archives at Paris or the double royal cubit of the Templ at Carnac."

But great as the difference is in this respect between th Atom of the ancients and the Atom of science, there are othe differences which are even greater and more significant. Thes greater differences affect not merely what the Atom is, bu what the Atom does. It is not merely in its physical constitu tion and definition, but in its powers and functions, that a nev world has been opened up in the doctrines of Materialism b the idea of the Atom as scientifically conceived. It is n longer a mere particle dashing about at random under the im pulse of projectile or gravitating force. In some respects in deed it has lost certain ideal and mysterious properties whic the ancient Materialists imagined as belonging to it. It is n longer regarded as infinitely small, or as infinitely hard an strong, or as absolutely impenetrable, or as so absolutely singl as to be in itself destitute of parts. On the contrary, it is no conceived as "already quite a complex little world," as a "piece of matter of measurable dimensions, with shape, mo tion, and laws of action which are intelligible subjects of scien tific investigation." The Atoms of some particular substance in the gaseous state have been approximately counted, approx imately weighed and measured; whilst the average velocity o their movements in a certain length of path has been made th subject of mathematical calculation.

So far it may be thought that the old Atom has been disen chanted of its mystery, and has been brought down into the terms of purely mechanical conception. But this is only one

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half of the truth—one aspect only of the discoveries of modern science in respect to the nature and functions of the Atom. Whatever of mystery has been subtracted on that side has been far more than added on another. The dynamic aspect now underlies the mechanical aspect, and forms, as it were, an investing medium, which not only surrounds but permeates the Atom and all its works. In the light of Chemistry the Atom comes out as the centre and the focus of energies and powers the most complicated and the most subtle that exist in Nature —so complicated and so subtle indeed, that the utmost resources of chemical and physical research are unable as yet to give of them anything like a complete or even an intelligible account. In the first place, the Atom is not one thing, but many things. Each of the elementary substances has its own separate Atom, with its own separate size, its own separate weight, and its own separate properties. In the second place, these properties are not absolute, but strictly relative to the corresponding properties of the Atoms of other substances which may be contiguous. Thus the Atom of oxygen is totally different from the Atom of carbon, and the nature of the difference consists, in so far as we can understand it at all, not only in differences of size and weight, but even more essentially in different dynamic relations of attraction which these elements bear to each other, and to the Atoms of other substances.

Moreover, the serelations of chemical attraction are curiously governed or limited by numerical laws, which have tasked the ingenuity of chemists to express in language. The power of one Atom to attract to itself and to combine with a definite number of other Atoms, and no more, is called its "Valency;" and according to the number which is the limit of its power it is called bi-valent, or tri-valent, or tetra-valent. Further, these relations between one elementary Atom and another have nothing to do with, or are at least wholly different from, the relation of gravitation. In Chemical Force Atoms do indeed attract each other, but not in a manner or degree which has any reference to each other's mass. The Atom of oxygen, for example, when in contact with the Atom of one substance, such as nitrogen, may be absolutely passive and inert, whilst in the presence of the Atom of another substance, such as hydro-

gen or carbon, it will manifest the most intense activity. Then, again, the nature of that activity, and of the activity of all other Atoms under the action of Chemical Force is peculiar. It cannot exert itself at all across any measurable distance. Chemical combination requires the closest contiguity, if not actual contact, and very often this contiguity or contact can only be brought about under conditions of heat or of solution, which must be carefully prepared. But when this contiguity has been brought about, then chemical combination is the activity of violent attraction, resulting in a kind of union or combination the most intimate and the most absolute which is known or can be conceived. Indeed, so close and so intimate are the unions effected by Chemical Force, that it is really not possible in the present state of our knowledge to conceive the ultimate nature of them.*

Two facts, however, respecting Chemical Force are certainly known. One of these facts is, that the unions it effects do not depend on mere mass, but are essentially selective—that they are possible only between certain kinds of Atoms, and are comparatively easy or comparatively difficult between other Atoms according to relations which we cannot understand, but which, for the want of a better word, are called Affinities. The other fact respecting these unions which we know is, that they are absolutely governed by curious numerical relations which are fixed and unalterable, or which, if they vary at all, vary according to some other numerical rule, which seems generally, if not always, to be a rule of exact multiple proportion. It is the first of these two facts which is perhaps the highest mys-

* Sir B. Brodie, in his interesting, but, I venture to think, obscure Lecture on "Ideal Chemistry," published in 1880, has said that whilst "various hypotheses, both metaphysical and atomic, have been framed to explain what (chemical) combination consists in, such hypotheses have not thrown the slightest light upon the question." Yet in the same Lecture he makes two contributions towards an explanation—both of them illustrating the hopelessness of the task. "Combination," he says, "is the operation by which matter is packed into space." Again, he says that "we must enlarge our view of the nature of combination, so as to include under this term not only the combination of matter with matter, but the combination also of matter with space." I presume this must mean the combination of ponderable matter with the luminiferous medium which is supposed to occupy all space. In any other sense a combination of matter with space seems devoid of any intelligible meaning. On the other hand, although it is possible and even probable that the "*Æther*" may play some part in chemical combination, no light is thrown upon the whole operation by the mere suggestion of so vague a proposition.

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tery of all. The selective attraction towards each other which exists between the Atoms of particular substances is called their Chemical Affinity. But affinity, like so many other words of science as well as of common speech, is a word which, when applied to material Atoms, involves a metaphor. Affinity between living things means, ordinarily, blood-relationship. Affinity between minds and characters means, in a secondary sense, a likeness of dispositions or a similarity of pursuits. In neither of these senses can Affinity be applied to the ultimate particles of Matter. But Chemical Affinity is not only different from, but it presents a positive contrast with, Affinity as understood in any sense analogous to these. The Affinity of Atoms is not only not founded upon likeness, but one of its commonest characteristics is that it is founded on unlikeness and on contrast. Homogeneousness is favorable to mere mechanical mixtures. But heterogeneousness is essential to most forms of chemical combination. Atoms combine, for the most part, not because they are like, but because they are radically different. It is now held that Atoms of the same kind may combine like Atoms of a different kind. But it seems doubtful if the Atoms in this case are not rather cohering than combined. At all events, in the language of Chemistry, affinity means nothing but the mutual tendency to combine—a tendency which may be so vehement as to be explosive, or so gentle as to be one of the slowest and most imperceptible operations of Nature. And then, when Chemical Affinity has had its way, we have a combination which is as mysterious as its cause. It is fundamentally different from a mere mixture or aggregation. It is essentially a Structure with energies as definite as its proportions. Under its influence the separate components may drop all the characteristics and all the properties by which they were recognized before; and the new compound acquires other properties and other characteristics entirely different from those of any of its parts.

Now, amid all the mysteries involved in these facts—amid all the questions and problems which they suggest, and which are wholly unsolved, and are perhaps insoluble,—there is one characteristic of them which stands out as clearly as the light of day. These complicated automatic Forces of Nature are of

such a character as to lend themselves to artificial manipulation in measures and degrees of inexhaustible variety. In them, more conspicuously, perhaps, than anywhere else in Nature, the most absolute fixedness and rigidity of "laws" is seen to be not only compatible with, but to be the one essential condition of, that largest freedom in the ultimate agencies of Mind which we can only think of as a freedom outside the physical chain of cause and of effect, but with boundless opportunity and means of acting upon that chain, and bending it to Purpose. Nowhere in Nature have such powerful and subtle instruments been placed in the hands of Will. We see and know this to be not only a possibility but a fact by our own very limited experience in the Laboratory. We see it and know it by the immense resources which even a very imperfect knowledge of Chemical Force has placed, and is daily more and more placing in our hands. We see it and know it, above all, in the nature of the methods by which these resources are made available, and in which they consist. Do we wish to break up some natural substance into the elements of which it is composed, so that we may have some one of these elements separated from the rest, and so that it may serve some purpose which it will not serve when it is combined? We have only to introduce into the compound which we seek to break up some new element to which the Affinity of our desired element is stronger, and thereupon that desired element rushes to the nearer friend we offer to its embrace, and leaves all others with which it had been associated before. Do we wish, on the other hand, to make some artificial combination of elements which are generally separate in Nature, and so to produce a substance which we know will have special properties, and therefore some special use? Exactly the same method in principle must be pursued. We bring together and place in close contact, under known conditions of heat or of solution, elements which we know to have mutual Affinities, and which under those conditions will have those Affinities set free to act. And then, these conditions having been brought about, the chemical Affinities exert their force, and forthwith some new substance is born into the world with powers and energies the most subtle or the most tremendous. In the Inorganic world

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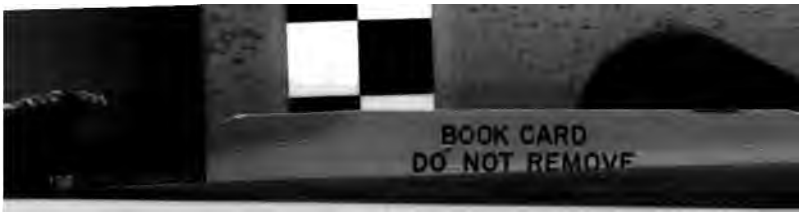
it may dissolve the most refractory metals, or rend asunder the hardest rocks. In the Organic world its very touch may be death to every living thing, or it may exercise on the Organism the most blessed virtue,—restoring the wasted tissues—re-animating the vital flame,—and carrying into the most secret recesses of Life the sweet influences of health. Such is the wondrous alchemy of Chemical Combination in the hands of Knowledge and of Power. Thus, whether our object be to tear asunder or to put together—whether it be analysis or synthesis—the mysterious forces and laws of Chemical Affinity give us the method and the means of attaining a wide range of appropriate purposes and intentions: and exactly in proportion to our knowledge of those Affinities, and of the conditions under which they can be brought to bear upon each other, by artificial combinations on the one hand and by artificial dissolutions on the other, we attain to higher and higher degrees of command over the most complex and the most powerful agencies in Nature.

Now it is precisely in this aspect of the manipulation of Chemical Affinity, or of the artificial uses to which it is put, that the System of Nature demands for the explanation of its phenomena the largest element of Anthropopsychism. It is quite true, indeed, that in this, as in every other department of Physical Causation, there are a thousand cases in which Chemical Affinity is seen acting under no obvious control—acting by itself and of itself—or, as it were, by accident. And these cases are in the highest degree instructive ; because they carry us on from the proposition that Chemical Force is a wonderful instrument of Purpose, to the farther proposition that when it is not under the control of Purpose—when it is not manipulated and managed—it would lead to nothing but universal inertia, and universal deadness. Chemical Affinity when left to itself would lead to saturation—to stable combinations—and these are incompatible with movement and with Life. In a former chapter I have alluded to an example which illustrates this distinction well. When oxygen combines chemically with metallic iron and forms the red dust with which we are all familiar, there is no suggestion of artifice or of structure. What is really artificial is not the combination,

but the separation between oxygen and iron, because pure metallic iron, uncombined with oxygen, is one of the rarest of all substances in Nature, and its very existence now as a common material in the world is due entirely to the artificial handling of Chemical Affinities by the ingenuity of Man. When left to itself in the presence of oxygen as that element exists in a damp atmosphere, it speedily returns to what may be called its natural condition, which is that of chemical combination with oxygen in the form of rust. So also when iron is left to its natural affinities in the bowels of the Earth, and when under heat it comes in contact with another very common element there, namely, sulphur, it enters into that combination which is so well known as pyrites or sulphuret of iron.

This is one of the innumerable cases of chemical combination which, when each of them is taken singly, and considered by itself, seems to be purposeless and purely accidental. It exhibits, indeed, the peculiar facts of Chemical Affinity in all their mystery, because we have no knowledge of the causes which determine the mutual attractiveness of oxygen and iron, nor of the real nature of the coalescence, nor of the causes which give to the combination of these two elements physical properties which are totally different from those which either of them possesses when alone. But there is no appearance of these two elements being brought together as it were artificially, so as to produce the particular substance which we know as the red rust of iron. As the world is constituted it is inevitable that they should come together. Oxygen is present in large quantities in every place to which either water or atmospheric air can penetrate, and it is hardly less ubiquitous as an element in other combinations, even when both air and water may be totally excluded. Iron is the most widely distributed of all the older known metals. Mind, therefore, has no obvious share in such chemical combinations as the rust of iron. The same thing may be said, probably, of all the other chemical combinations which exist in that Province of Nature which is called the Inorganic. All the rocks and minerals, all the gases and the vapors of which the Earth is composed, are mixtures or combinations of about some 63 elementary substances, according to the Chemical Affinities which prevail between



them under various conditions of dryness, or of solution, of dispersion, or of condensation, or of heat and pressure. The most precious and the most beautiful resulting compounds, the ores of metals, the porphyries, and the granites, and the tinted marbles, the crystals, and the gems—the getting and the showing of which have in all ages been one of the pursuits and one of the pleasures of Mankind,—have all been apparently produced by accident amidst the throes and pressures of gravitation, the fires of combustion, and the eruptions of volcanic force. They are found where these agencies have happened to place them and to form them,—sometimes ready for human use, at other times requiring the most laborious exertion to mine them, and to reduce them to the forms in which they can be made available. Each individual case of chemical combination in all its immense variety of products, may seem to be a fortuitous concourse of Atoms brought about by the interaction and play of Forces blind in themselves, and blindly acting under no special or visible direction towards an intelligible end.

In this respect each bit of the Inorganic world may be like each bit of some great picture. A little pigment adhering to a patch of canvas may be all that could be seen in the one case. Some common elements naturally uniting may be all that is visible in the other. But both these aspects of the facts would be alike delusive. It is only when we stand back from a picture at a sufficient distance to take in the whole, that the separate patches of adhesive paint take their place as component parts in one general effect. In losing their significance as substance or material, they acquire a new significance as Art or Work. So it is in Nature, when we stand back from details and take a general view of the Chemistry even of the Inorganic world. There are a thousand things in that Chemistry which when looked at by themselves seem to be the merest accident; and yet when we do stand back from them and look at them in their proper place, we see that they fit in with other things of a different order, in endless connections of harmonious coincidence. They are accidents as we call them, but they are accidents, perhaps, without which we can see that the conditions of human life would have been different, less happy, less

convenient,—without which Man's art could never have been what it is,—without which he could never have built such houses or such ships, or constructed such machines as are now the indispensable instruments of his command over the resources of Nature.

And even more than this may be said of some of those curious chemical facts of the Inorganic world which, in themselves, may seem most fortuitous. The air we breathe and the water which we drink are, the one a mechanical mixture, and the other a chemical combination, on the specific properties of which all Life, as it is constituted on Earth, depends. We have no clue to the process by which our atmosphere has been made up of gases which are not in chemical combination, but are only diffused or mechanically mixed, whilst yet, like a chemical combination, the mixture is one of exact and definite proportions. It does not seem as if this process could be purely physical—that is to say, the mechanical result of the Physical Forces acting by themselves. There is no known law, in this sense, by which such a result could have accidentally come about. But we have a clue, and a very clear one, to the "reason why" this arrangement should be as it is. Oxygen, when alone, has such fierce and unsatisfied affinities with other substances that if this gas were pure or undiluted no Organic structure could stand against it. And so, in atmospheric air it is toned down and softened, as it were, by a large admixture and diffusion of another gas, nitrogen, which is comparatively inert, and then to both are added in much smaller proportion another element, carbon, which is the food of Plants, and an indispensable ingredient in all Organic structures. Nor is it less clear why this mixture should be established in fixed proportions. Any variation in these would throw into confusion all the laws affecting the growth and respiration of the whole animal and vegetable world. Whether we regard these structures as adapted to the atmosphere or the atmosphere as adapted to them, there can be no question of the relations of Unity which prevail between them, nor can there be any question that these adaptive relations are not the work of chance. Again, in the composition and in the properties of water we have a still more striking example both of the obscure nature and of the wonderful results

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of Chemical Affinity, as well as of the powerful instrumentality which it affords to Knowledge and to Power. That water, with its many special and peculiar properties, which make it the great natural antagonist of fire, should consist of nothing but two gases, one of which is the most inflammable of all substances, and the other of which is the great cause and agent in all combustion,—this is, indeed, a fact which may well give us a high estimate of the mystery involved in the transforming power of Chemical Combination. And in the width and sweep of that transforming power we see the indefinite room which is afforded by it to special arrangement and manipulation.

In the working and management of this great fount and source of Energy, then, Nature is intensely anthropopsychic. That is to say, it is full to overflowing of combinations which have all the characters of manufacture and of Art. Water, without which our Earth would be a desert, and our own bodies would be dust, is an article which can be manufactured in the Laboratory even more purely than it is manufactured in Nature; but it can only be manufactured by first isolating the two constituent gases, and then by bringing them together under the conditions in which alone they can combine to form the new and totally dissimilar substance whose various and complicated properties make it one of the prime necessities of Life.

It is a favorite item in the belief of many Evolutionists that in the Ocean all Life began. And it is undoubtedly true that even now, when the evolution of Organic Life has run a long course, the Ocean is far more rich in animal Life than the solid Earth. There is no zone or region of the Sea which does not swarm with Life. Its very substance is often, as we know, luminous with creatures whose numbers must exceed all our standards of numerical comparison. Not all the grains of sand on all the shores and on all the deserts of the Globe—not all the visible stars of heaven can approach their multitude. The very stones which the Sea covers for only a portion of the day are encrusted with innumerable hosts, whilst all the fronds of its vegetation and every square inch of its various deposits are full of legions of living things. Nor are the creatures which swarm in the Ocean creatures only of a low type of Organization. They belong to every Order and to every Class from the

lowest to the highest. Living together in close communion, sometimes as each others' guests and hosts, we have in the Sea living things with no visible structure, but with the wonderful power of separating from the water the almost infinitesimal percentage of lime and of silex which it holds in solution, and of building them up into exquisite forms of beauty: other living things with a high and very obvious structure, which have the same power of building homes and houses for themselves of another kind: others again whose own external skeleton is more complicated than the finest jointed armor of the Middle Ages, and whose plates and scales are yet so arranged that each can grow round its own margin, and retain its relative place in the enlargement of the whole: others yet again in whose close articulations this operation is impossible, and which therefore have been given the power of extricating their own body from its coat and panoply of mail, and of reproducing the whole every year from the surrounding waters. Then, again, on all these creatures, more or less, there are others in innumerable multitudes which grow like plants and which bud like flowers; whilst around and overhead we have the earliest members of the Vertebrata in immense variety,—together with gigantic representatives of the Class, Mammalia, concealed under the outward form of fishes—some of them having brains nearest in proportionable size to the brain of Man. Nor are there wanting creatures which seem links and passages from marine to terrestrial life—the Dugongs, the Manatees and Seals, which are more or less amphibious, and some of which have limbs seemingly on the way from fins to legs. It is not wonderful, therefore, that the Sea should be regarded as the mother of all flesh. Water, in itself, constitutes a very large proportion of the substance of all Organisms, and the life of most creatures living in the Sea entirely depends on the capacity of water to hold in solution a certain adequate amount of free oxygen wholly separate from that proportion of the same gas which enters into its own chemical composition. The gills of fishes and the various breathing apparatus of other marine Organisms have no power to decompose water—that is to say, to separate the oxygen from its chemical union with hydrogen. They can only appropriate the free or uncombined oxygen, which is dissolved or held as a

mechanical mixture in the water. All marine life, therefore, depends on this property of water—that, besides or over and above the amount of oxygen which enters into its own composition, it has power also to hold in solution another proportion of the same gas in a condition which leaves it free to enter into a separate combination with the circulating fluids of living creatures.

Here we have a cycle of adapted relations between the Organic and the Inorganic which is only one of many. Again, these relations cannot be accidental, and we see that the "firmament of waters," which covers by far the largest portion of our Globe's surface, has a constitution and properties which must have been determined before Life began, but which, nevertheless, had anticipatory relations to that Life which was to be. And yet those relations are not the simple relations of physical cause and of effect, for water does not of itself generate Life, nor can it hold Life in solution as it can hold the salts of iodine and of potassium. The Intelligibility of Nature demands that we should recognize in these relations the work of Chemical Affinity in the Inorganic Province, working under conditions analogous to those under which we can ourselves work it, when we know and use the methods which it affords to our own Intelligence.

Nothing, indeed, can be more instructive than those methods, or the principles which they involve. For just as in mechanics the storage and the control and the distribution of Force by human device, show that the most absolute and rigid laws are the best servants of Contrivance, so in chemical science the same great principle receives a yet more signal illustration. It was the Chemistry of Nature which long concealed from Man not a few of the most valuable materials of his industry, and it was only when he discovered how richly that Chemistry lends itself to his own management and control that he came into possession of them. One principal part of the history of Civilization is the history of the chemistry of the metals. There is a deep significance in that classification of the stages of human progress which has been founded on the successive use of Implements of stone and of bronze and of iron. So completely do the laws of Chemical Affinity when uncontrolled cover up and conceal the

metals, that even now for the most part we forget how many, how various, and how curious they are. Our common impression would be that of the various substances in Nature a small minority are metallic. Whereas, on the contrary, the fact is that of the sixty-three elementary substances into which, according to our present knowledge, all material combinations can be reduced by chemical analysis, the great majority—some forty-eight—are metals. The progress of chemical science is discovering for some of these metals refined uses and applications which are already numerous, and which may become more numerous from age to age. But in respect to the greater proportion of these metallic elements, the utility of them lies in the natural combinations in which they are actually found. Potassium is of little or no use except in the form of Potash. Sodium is of little or no use except in the form of Soda, or of the chloride of Soda, which is common Salt. And so in a great majority of cases the metals are valuable only in the combinations which they form with substances which are non-metallic.

Of all the metals, there is only one which in Nature is generally found in the metallic state, either pure or with such slight alloy as not to detract from its lustre and its beauty. That metal is gold. But although on this account it was probably the very earliest of all the metals to attract the attention of Mankind, and although on the same account it has been taken from the earliest ages as the chief standard of value, and is pre-eminently called the "precious metal," it is in respect to everything except ornament the least useful metal existing in the world. As regards the other metals, it is Chemistry alone which explains the order of precedence in which they have been discovered and applied to use. It is Chemistry alone which explains how it came to pass that the most useful of all metals, iron, is at once the commonest, the most widely distributed, found in the greatest masses, and yet was the last to be known and to be separated from the other elements with which it is ordinarily combined. The explanation is very simple. The commonest ores of iron are those in which the metal is combined with oxygen or with carbonic acid. In both these cases the combination *has no* metallic appearance, and the invaluable properties of the *metal* are neutralized and concealed. On the other hand, the

principal metal which came earlier into use, copper, is, though much less common than iron, more usually combined with sulphur, and in this form the metallic lustre and appearance is rather enhanced than injured. There are no more beautiful ores than the sulphurets of copper; none more calculated to attract the notice of primeval Man. It is true that iron is also very commonly combined with sulphur, and that the sulphurets of iron are as obviously metallic as those of copper; but it is equally true that the affinity between iron and sulphur is so vehement that it is most difficult to separate them completely; and that the smallest percentage of sulphur is destructive of the most useful properties of iron. Hence it came that a metallurgical operation which may seem to imply very advanced knowledge, namely, the formation of an alloy between copper and tin, and the application of this alloy to the manufacture of implements, was an operation which apparently in all countries long preceded the much more simple and the much more effective operations which suffice for the production of iron and steel.

All these operations are in their nature chemical, and each one of them illustrates how Chemical Affinity is the most supple and subtle of all tools in the hands of Knowledge and of Purpose. One fundamental principle lies at the root of all, and that is that the elements which are to be broken up from some existing combination, must be presented to other elements in the order of new affinities, and under such conditions, first of contact and then of heat or of solution, that these affinities have the freest opportunities to act. Thus if we wish to separate iron from the oxygen or the carbonic acid with which it is combined in Nature, we have only to melt it in contact with some other element which has a still greater affinity than itself for these substances. Under this discipline of arrangement they can be made to leave the metal, and combine in preference with other bodies.

Now, arrangements of this kind are exclusively the work of Mind, and it is in the conceiving of them, and in the effecting of them, that its supremacy consists. The selection of the elements which are to be placed in contact, and the preparation of the chemical or physical conditions under which that contact is to be effected,—these are the essential operations

which must be conducted under the guidance of knowledge, and with a view to the attainment of a specific purpose. For the attainment of any purpose Man must use the laws of Nature as he finds them, and those laws, as regards Chemistry, demand that he should know the facts, and know how to use the facts, respecting the selective affinities of one element for another. In order to separate, he must know how to join; and conversely, in order to join, he must know how to separate. For the fundamental principle of all such operations is, that very often the separation of one element can only be effected by contriving for it some new combination with others. Substitution is the key to all the higher products of Chemical Analysis, and to all the higher methods of Chemical Synthesis alike. Many of the results thus attained are highly artificial, that is to say, that although they are the product of natural affinities, these affinities are brought to act under conditions that could never occur without management and contrivance. Thus, to take a particular example, the metal potassium has such affinity for oxygen, that it cannot be reduced to the metallic state nor kept in it, except by very elaborate operations and precautions. If this metal be exposed to the air, it rapidly attracts the oxygen; and if it be thrown into water, the combination is so violent in its energy, that the strange spectacle is exhibited of water bursting into fierce combustion. This is a very simple case,—the case of an element which under purely natural conditions refuses to remain uncombined. But exactly the same principle applies to the converse case of innumerable combinations in which the elements under purely natural conditions tend to separate and cannot long be held together, because they have, as it were, been compelled to unite under conditions which are highly artificial. These artificial conditions very often can with difficulty be maintained, or possibly they cannot be maintained at all, beyond a certain time. This is the case with many compounds in the mechanical arts, and especially in the pharmacopœia,—compounds which, being thus highly artificial, are consequently liable to decomposition and decay. Chemical Affinity, under control, was employed to make them; but Chemical Affinity, escaping from control, cannot be hindered from unmaking them again. All such compositions have

a character of their own. In one sense they are natural, in another sense they are not. They have all been made by natural laws, but they belong to a System in which purely Physical Causation is subordinate and not supreme. In them the laws of Chemical Affinity have not indeed been violated, but they have been manipulated. They have been made to do work which they never could or would do except under the discipline of Mind, and for the accomplishment of its aims.

CHAPTER VII.

THE ELEMENTARY CONSTITUTION OF MATTER IN RELATION TO THE ORGANIC.

In the last chapter we have seen the artificial character and aspect of the comparatively few chemical combinations which Man can effect in the Inorganic Kingdom of Nature, and we have seen too that in that part of the System of Nature there are some mixtures and some combinations of primary magnitude and importance which seem to be equally artificial. But there is another great Division of Nature in which Man cannot work at all, and yet the whole of which is occupied by combinations on which the same stamp and character are still more visibly impressed. This is the Kingdom of the Organic. In this Kingdom all the chemical combinations which are employed are in the highest degree artificial, complicated, and what chemists call "unstable." Here Chemical Affinity is seen working under, as it were, a double servitude. It is called upon to make up certain special combinations of material, in order that these may again be worked up into special structures under the power of that other and higher kind of Energy which we know as Life. In this series of operations, Chemical Affinity may well be called by the title which is the traditional title of the Popes of Rome. It is the "Servus Servorum Dei."

Here, again, in order to see clearly wherein the Unity of Nature is to be really found, we must observe distinctions which the language of science is in danger of confounding. We talk of "Organic Chemistry," and the phrase may have a legitimate meaning, if it be properly understood. But there is a treacherous and perilous ambiguity in it. It is curious to trace the loose and deceptive passages of meaning by which phrases of this kind are made to introduce and perpetuate the grossest fallacies. Organic Chemistry means the chemistry of Organs. But the chemistry of Organs may mean either of two very differ-

ent things. It may mean the chemistry which makes Organs, or it may mean the chemistry which Organs make. Now, in the first of these two meanings it is nonsense. There is no mere chemistry which can make an Organ. There is no laboratory which can turn out, or build up, even the lowest living Cell. But in the second of these two senses, the phrase Organic Chemistry has an important meaning. Life, as the Energy of living Organs, has undoubtedly a chemistry of its own; that is to say, it makes up compounds which no other agency can make.

But before examining further what Organic Chemistry is, in the only sense in which it corresponds to the realities of Nature, let us examine a little more carefully the other meaning in which it corresponds with no reality at all. For let it be clearly understood that mere Chemical Affinity, so far as we know, cannot produce any "Organism," however simple or however low. It can only produce the material substances out of which, by a separate process, Organisms are formed. Chemical Affinity, again, when an Organism has been formed, can and does produce, under the special kind of energy to which that structure is due, and which is indwelling there, new combinations which are sometimes called "organic," not because they have Organic Structure or anything approaching to it, but because living Organisms alone can make them. But, in the proper sense of the word, it is obvious that nothing ought to be called organic which has not itself an organic structure. Now Chemical Affinity, so far as we know, can give rise to no structure beyond the structure of the lifeless Molecule. What that elementary kind of structure is we have no knowledge until we know the ultimate nature of Chemical Combination. But we know that it is not a structure at all in the same sense in which an Organism is a structure. The simplest living "Cell," whether of vegetable or of animal Life, is a structure of a kind such as no mere chemistry can produce. On the other hand, the substance of which that Cell is made is a chemical compound, and generally a chemical compound of the most complicated nature. Moreover, the Cell is again capable of calling upon chemical affinities to provide for it new material, on the one hand, and to take away from it, on the other hand, certain old

material in the form of degenerate combinations which are waste. Properly speaking, therefore, there is no chemistry except the chemistry of the Inorganic, although the unorganized or elementary, lifeless, and comparatively structureless compounds which chemistry is alone competent to produce, are the necessary materials of all living structures. Accordingly, when chemists are compelled to define more accurately what they mean by Organic Chemistry, they are obliged to confess that all they mean is the chemistry of the "Proteids," or of the "Hydro-Carbons." That is to say, it is the chemistry which produces a definite series of compounds (chiefly of Hydrogen and Carbon), which Life in living Organs is alone competent to produce. In this sense, but in this sense alone, Organic Chemistry is separate from other chemistry—that is to say, it represents a separate group of compounds—just as the chemistry of the "Aniline Dyes" is separate from the chemistry of the "Alkaline Metals," or the chemistry of the "Cyanogen Compounds" is separate from both.

Hence we see the futility of the controversy which has been so keen upon the question whether the Chemistry of Life is or is not the same as the Chemistry of the Inorganic. In one sense it is the same, in another sense it is different. It is the same in so far as the elementary substances contained in living bodies, and in the products of living bodies, are elements identical with those which exist in lifeless things. It is different in so far as these elements are worked up into combinations which are effected by no other agent than Vitality, and exist in no other department of Nature except that of living things. One of the great peculiarities connected with them is the very small number of the elements concerned, and the extreme and subtle complexity of the combinations which these elements are made to assume. So great is that complexity, that it escapes all the ordinary formula of chemical notation, and some writers now even contend that it casts serious doubt on at least some parts of the Atomic Hypothesis, which is the best explanation of almost all other chemical combinations. On the other hand, there is no reason to believe that in the compounds which are called Organic the ultimate laws of Chemical Affinity are altered or suspended. The impression which these so-called organic

compounds give to chemists is that they are effected on the same fundamental principle on which all other combinations are effected, and that is the principle of the ultimate elements being so brought together that they are compelled into arrangements amongst each other, and substitutions for each other, into which they never are compelled except under the energies of Life. The phrase which chemists always adopt, and are obliged to adopt, in order to convey to others the image or impression which these compounds leave upon the mind is this,—that they are "built up."

Here then, again, as in so many other departments of science, we find that the anthropopsychic or teleological interpretation of Nature is the inseparable and insuperable result. Nor is it less curious to observe how even the apparent exceptions, which are seized upon and dwelt upon as proving that Life has no special chemistry of its own, are exceptions which, when cross-examined, give evidence against their Counsel. We are told sometimes in great triumph that certain products which are called Organic can now be made by human artifice in the Laboratory. But two questions have to be asked concerning this boast, and in both of them the answer dispels the argument. The first question is, What are the combinations which can be thus made? and the second question is, How is the making of them effected?

The answer to the first of these questions is, that no fragment of Matter which can strictly be called Organic—that is to say, no fragment of Matter having Organic Structure—has ever been made in any laboratory by the hands of Man. What he has succeeded in making has been some one or two of the unorganized compounds which living Organs make, or rather which are among the products of their decomposition and decay. Urea, one of the waste products of the animal Organism, is the principal triumph of what is ambitiously called the "Organic Chemistry" of the Laboratory. There is a hope and a promise, indeed, of greater triumphs of imitative skill. Some progress seems to have been made in "building up" in the Laboratory some of the valuable "Alkaloids" which enter into the composition of certain vegetables. But none of these successes of chemical manipulation, even if they were multiplied a

hundredfold, bring us one step nearer to the manufacture of anything which really belongs to the Kingdom of the Organic. We might as well boast of making an "Organic" compound when we have made, as it is easy to do, sulphuretted hydrogen or ammonia. These, too, are among the combinations which are Organic in the sense of being given off by Organisms either in action or in decay.

But the answer to the second question is even more important than this answer to the first. How has Man succeeded in manufacturing the so-called Organic compound of urea? The answer is, by "building up." By careful analysis he has first ascertained the elements of which it is composed, and again by a highly artificial and elaborate manipulation of those elements he has got them to combine in the required proportions. Is not this an analogy which strengthens the conclusion which it was intended to refute? For just as Chemical Affinity has been made the servant of a little knowledge and a little skill in the manufacture of urea, so to all appearance has it been made the servant of knowledge and of skill which by comparison is infinite, in the "building up" of those subtle, delicate, "unstable," almost evanescent compounds which are the requisite materials of living Organs.

And here I must return to the great distinction which has already been referred to, but which cannot be too constantly kept in mind. Chemical Composition is one thing—Organic Structure is quite another thing. And if "building up" is the anthropopsychic metaphor which chemists are compelled to adopt when they wish to express the process by which the mere substance or material of living Organs has been prepared, with how much greater force must this analogy be applied to the farther and wholly different process by which the composite material has been farther "built up" and woven into Organic Structures? In the Inorganic world, indeed, there are many arrangements of material which are so regular and formal that they, in a certain sense, may be called structural; and these arrangements are effected by a kind of energy which, if not purely chemical, is in such close alliance with it that there is certainly some very near connection. Such is the structure or the forms of crystals—definite shapes which many substances

assume when passing from the liquid or from the gaseous state into the condition of solidity. But the structure of a crystal is due to nothing but the simple or mechanical aggregation of its molecules along definite lines of force. There is no internal structure in a crystal different from the exterior. A cubical crystal is made up of an indefinite number of little cubes. An octohedral crystal is made up of an indefinite number of little octohedrons. Through and through the whole mass there is a perfect uniformity in the method of molecular aggregation. It is a mere mass of molecules compacted together in a particular shape. It is a mere congeries of identical units marshalled and drilled into coherence in a certain form and order.

In all this there is an immeasurable distance and difference between the Organic and the Inorganic. It is only by inventing forms of speech which suppress this difference that the phraseology of pure Materialism can be applied with even a semblance of sufficiency to the Structures which are at once the work and the abode of Life. "Molecular arrangement" is one of those phrases which have been thus invented, as expressing the fundamental principle on which all differences consist in material structures, whether dead or living. I do not think that this phrase is adequate to express or to afford any explanation of the differences which prevail even in the sphere of the Inorganic. There is something in the nature and effects even of mere chemical combination which cannot be conveyed in the terms of any purely mechanical conception. Yet on this subject the common phraseology of scientific men has hardly advanced at all since the days of Lucretius. The Ancients had an idea that the Atoms of matter were held together by means of "hooks" mutually intertwining. And so in our own day the most eminent physicists are obliged to have recourse to the analogous conception of the Atoms in chemical combination being "linked," or "interlocked," or "tightly clasped," or "paired," or "grouped" together. This kind of phraseology is all very well, provided it be borne in mind how dim and how distant the analogy is, and how powerless it is to express the facts which Chemistry has revealed. The only one of these facts which it serves to keep in mind is that the separate Atoms are *never lost or wholly* merged, because they can always be

recovered again in their original integrity. But during the combination we do not know how they are affected. It looks very much as if they were absolutely interfused, in such a sense and to such an extent as almost to undermine the doctrine that "Impenetrability," or the absolute Occupation of Space, can be really reckoned among the inherent properties of Matter. No image suggestive of mere grouping in any form, however intricate, can be other than delusive and empty of the truth. Chemical Combination is essentially dynamic, and not mechanical. Moreover, it is selective, and not indiscriminate. No mere method of arrangement among the particles of Matter can produce the changes which Chemical Combination makes. We cannot convert a brick house into a marble palace by simply relaying the bricks in an altered fashion. And yet this would be a transformation very simple and very easily conceived when compared with the transformations which are effected by the combinations of Chemical Affinity. Under the power of it, Atoms which are in themselves passive and inert become possessed, when combined, of the fiercest energies. And vice versâ, Atoms which when alone are intensely active, pass when combined into a passive state, and thus a perfect equilibrium may be established among Forces which no other agency could control.

But however great and insoluble may be the mystery attaching to the ultimate nature of these laws of Chemical Affinity, we can at least read in them the same lesson on the relation which they bear to the Organic world which we have already read in them on the relation which they bear to the Inorganic. We can at least see very clearly what tools and materials they supply for the "building up" of Organic Structures. I have spoken of this lesson as it comes home to us in the Laboratory, where the advancing knowledge of analysis is leading every year to more and more elaborate possibilities and results of Synthesis. All these results are in the lower Kingdom of the Inorganic. But in that Kingdom they are veritable edifices; compounds "built up," as the chemists say, by the dexterous use of Chemical Affinities, and by the artificial procurement of *the conditions* under which they must enter into some foreseen *combination* and produce some desired effect. But the most

elaborate and ingenious of these combinations are after all structures only in the same sense in which crystals are structures also. They may be more or less elaborate—more or less artificial—more or less imitative of the combinations which are found in Nature, and which give value to one or other of her products. Yet whatever structure they have is always purely and merely chemical. They are mere symmetrical and uniform arrangements or combinations of Atoms and of Molecules. But the structures which are "built up" by Life with the help of Chemical Affinity in the Organs which are its own home and seat, are structures in a very different sense indeed. They are no mere aggregates of Atoms or of Molecules, each like the other, and all similarly struck, or "hooked, or linked, or grouped" together in identical forms indefinitely repeated. Nor are they even mere chemical combinations. In every bit and particle of every living Organism, Difference and not Identity reigns supreme,—Difference not necessarily of chemical composition, but of physical constitution,—Difference not passive but active,—Difference not of substance but of function,—Difference not in what the Atoms and the Molecules are, but in what they are set to do.

Segregation and not aggregation is the fundamental operation of constructive Organic Chemistry. It is first the selection and separation of certain Atoms from pre-existing compounds, and then again the fitting of these to others which also must be selected with a view to qualifying them for definite functions. And in every Organism, for the doing of an almost infinite variety of things, it is farther necessary that out of a very few elements an almost infinite variety of structures should be "built up." How infinite that variety is can only be appreciated by those who have made a study of microscopic sections of vegetable and animal tissues. The beauty and complexity of these tissues even in Plants is very great; but they are simplicity itself when compared with the tissues of the higher animal Organisms. Even the very word "tissue," though perhaps the best we have, suggests but a feeble image. Every animal Organism is Structure through and through. Its whole substance, and, as it were, its whole essence, is Structure and nothing else.

The unit of Organic Structure is the Cell, and every living Cell is a whole world in itself, with indwelling capacities and powers as various as the ultimate causes of them are mysterious and inscrutable. There is a whole class of animals, many of them of exquisite form and beauty, which are held to consist entirely of one Cell. In every higher Organism the activities of the Cell are mysteriously co-operative and subordinate. But although the causes are inscrutable, the ends and objects,—the purposes and functions,—of every Organ, which is built up of Cells, can, for the most part, be defined and understood. In the first place, there is one great end governing the whole, and that is the establishment and maintenance, in the midst of other things, of a living Unity—an Individuality with a Will of its own,—a Personality—which shall be complete in itself, and more or less completely separable from all surroundings. Given certain physical conditions which we see as a fact to be essential to the existence and enjoyment of Life, then every particle of every Organism is simply part of the required mechanism for the meeting of these conditions; and its only explanation to us consists in the perception of its relation to this purpose. Throughout each and every Organic Being the primal combinations, and the primal units of living structure, are shaped and moulded into forms which, as regards their purely physical and organic office and functions, have all either a purely chemical or a purely mechanical explanation. The preparations, for example, of acids and of emulsions for the dissolving of foreign substances is a perfectly intelligible preliminary and preparation for the processes of digestion. The elongation and flattening and longitudinal arrangement of Cells into tubes of many sizes, some large, some microscopically small, are, in like manner, perfectly intelligible preparations for the conveyance of circulating fluids. The condensation and elongation of the same Organic Units into the cords and threads and fibres of nerve-tissue, and the enclosure of this most highly organized substance again within protecting sheaths, are not less intelligible provisions and adaptations for the conduction of these sensory movements in which galvanic currents are probably concerned.

Perhaps no Organic substance, whether we regard it in its

composition, or in its structure, is a better example of complexity than the blood. We speak and think of "atoms," even in the Inorganic world, as endowed with properties so wonderful and mysterious that some men doubt their existence, and others, like Sir J. Herschel and Professor Clerk Maxwell, can only regard them as "manufactured articles." But in the blood we have an example of a fluid, in which one essential element is a multitude of bodies so minute that to the Ancients they would have perfectly represented all that they could conceive of Atoms. I refer to those bodies which are called the "corpuscles" of the blood, bodies so minute that one cubic millimetre of the fluid is estimated to contain five millions of them—that is to say, that one cubic inch of blood would contain eighty millions of these corpuscles. Yet each one of these corpuscles is an Apparatus in itself. It is not a simple body, but complex and full of differences. It is a framework in which are imbedded various compounds, and particularly the "Hœmoglobin" to which the whole liquid owes its peculiar color. This substance is among the arcana of Life. There is no human priesthood privileged to go within its veil. The chemist can analyze it indeed and can tell us of the elements of which it is composed. And what he does tell us is curious enough. Alone of all the constituents of the body this mysterious "Hœmoglobin" contains iron. Besides this, it contains the usual three gases with a special supply of oxygen, whilst it holds also sulphur and carbon in definite proportions. But this is not all. The framework of the corpuscles in which this precious material is held entangled or enclosed, is so complex in its constituents, that it may be said to contain a whole laboratory of chemical elements. Besides chlorine, phosphorus and sulphur, there are the four metals, potassium, sodium, calcium and magnesium.* And then, in addition to all this world of complexity in the red corpuscles, there are besides another vast number of corpuscles which are uncolored, in the proportion of about 1 to 350 of the red.† These also are—perhaps even more than the red corpuscles—among the secretest things of Nature, for they are not easily distinguishable from the separate Organisms which are the low-

* Foster's "Text-Book of Physiology," p. 29.
† Gamgee's "Physiological Chemistry," vol. i. p. 124.

est forms of individual Life. These colorless corpuscles are said to move like the Amœba—a well-known Microscopic Organism —and they seem to pass through the walls of all the vessels as if there was nothing in their way.

The ultimate cause of the necessity for all these things is beyond us. That is to say, we do not know why Life could not exist and flourish without a physical machinery so highly complex. But given the necessity of the circulating fluids of the body being placed in contact with the oxygen of the atmosphere, then this necessity explains the preparation of some "Organ,"—that is to say, of some special Apparatus,—in which these fluids may have the requisite exposure to atmospheric air, and may, nevertheless, be kept from spilling. This again requires that the walls of the vessels should have a certain physical constitution and structure, through which certain elements can pass freely, whilst at the same time the liquids are prevented from escaping. Among all the wonders of Nature, there is perhaps no wonder greater than the Circulation of the Blood. Its physical, its mechanical, its chemical, and its vital phenomena are all equally complicated, and are all intimately interwoven. The current of the blood is like some great river, now running in one wide channel, now dividing into a thousand rills, but everywhere bearing in its stream vast multitudes of little rafts more numerous than all the ships and boats and navies of the world, each laden with a precious cargo, and each yielding up that cargo as well as its own materials to repair and reanimate the tissues which are suffering loss or exhaustion from the work and the waste of Life. Still more purely mechanical are the necessities and the methods which explain the bony structure of the animal body, which, whether in the position of an external or of an internal skeleton, is an essential part of the Apparatus belonging to all the higher forms of Life. The physical necessity is clear. Every muscular movement must have its fulcrum, and the demands of gravitation require that soft substances of considerable weight should have some rigid support to save them from collapse.

These are but a few examples of the one great principle on which all Physiology depends. They are examples which give us some idea of the immeasurable distance that lies between the

Organic and the Inorganic. It has been said by a very eminent man that "the process of development of the egg, like that of the seed, is neither more nor less mysterious than that in virtue of which the molecules of water, when it is cooled down to the freezing point, build themselves up into regular crystals." * It may be quite true, indeed, that the crystalline arrangement of Matter is in itself mysterious, because we do not know the ultimate source or nature of those "lines of force" along which the particles of Matter are compelled to range themselves into definite forms. But if it be possible to have any degrees in the scale of ignorance or of mystery, where all is profoundly dark, there is really no sort of comparison between the mystery which attaches to the processes of Crystallization and the processes of Organic Structure. As mere processes they are really incommensurable. There is a fundamental difference between all forms of mere orderly aggregation and even the very lowest form of living structure.

In one aspect, indeed, it may be said with truth that there is less mystery in the Organic than in the Inorganic Kingdom, because the processes of Organic growth, however mysterious and indeed inconceivable they may be as processes merely, are at least illuminated by the clearest light in their relation to fitness and utility. But in crystalline forms there is no obvious utility. I do not know that we should necessarily lose anything of essential value to human life if all substances were as amorphous as many of them actually are. But at least in all Organic Structures the light of adaptation shines like the Sun in Heaven. In this lies the pre-eminent interest attaching to Biology. It is a branch of science which, in proportion as it concerns the highest department of Nature, becomes more and more anthropopsychic because above all others it essentially consists in the mental recognition of structural developments which advance along lines of adaptive purpose. For in the course of this development, it is above all things remarkable, that always in the earliest stages every step in growth must go before the use which it is to serve when finished. No Organ can be used until it is fit for use, and the gradual adaptation to that use, through innumerable stages of growth and of development, is an adaptation which is always

* Science "Primers—Introductory," By Professor Huxley, p. 92.

anticipatory and prophetic. As regards each individual Org ism in its progress from the Ovum to maturity this is an versal and an unquestionable fact, which proves that the viceableness of Organic Structures for particular functions m under any theory, whether it is called Evolution, or whether called Creation, have existed in preparation before it can h existed in fact.

It has often occurred to me that this same order and succes of events may be the real explanation, in some cases at leas the strange and mysterious phenomena of rudimentary Org separated from all actual use, or possibility of use, in cer animals. On the theory of Evolution every existing creat must have existed potentially in the earliest Germs. That i say, those Germs must have had an innate tendency to deve ment along certain lines of structure. Nothing therefor more natural than that Structure should sometimes run forw as it were, upon those lines, and should become visible q apart from the actual occurrence of conditions calling for its If, for example, the earliest mammalian Germ had "potential in it all the latest developments of the Class, it is quite in ligible that some portions of the perfect structure should traceable in creatures which are never destined to have th completed, or to need their services. Indeed the general p ciple which is involved in this idea is recognized in a well-est lished doctrine of Comparative Anatomy—namely this,—t all Organic growths which are highly specialized and appare separated from others, are in reality nothing but exaggera developments of some bit or rudiment of structure which ex throughout the whole Class to which it may belong in Nat In these bits of structure the future development may be sai have pre-existed. Without these roots the growth could have been. In them therefore the Previsions of Nature are, it were, embodied. In them we have a physical basis for conception, apparently ideal and almost transcendental, of Potential existence of all creatures in the earliest germs.

A striking illustration of this idea and of its correspond doctrine in Comparative Anatomy, is to be found in Profes Flower's most interesting lecture on the Origin of Whale

* "Nature," No. 713, Vol. 28.

Probably there is no growth in Nature which seems more absolutely unique, and separate from all others, than the Baleen or Whalebone apparatus which fills the mouth of certain genera of Whales, and constitutes the only Organ by which they can seize and detain the myriads of minute creatures which form their food. Yet Professor Flower has clearly identified its origin as only a modification of a bit of structure which exists in almost all mammals,—the roots of it, as it were, being in certain ridges and papillæ of the Palate,—these being specially visible in that most singular creature the Giraffe. It is at least possible that this also may be the explanation of these other bits of structure which have been supposed to be aborted by disuse. In the metamorphoses of Insects, certain Organs of the perfect Insect, or "Imago," are sometimes visible as rudiments in the imperfect or larval form, although in that form these rudiments have no use or function. In these cases, all such rudiments have their interpretation not in the past, but in the future. They are fashioned and prepared not by use, but for it. And indeed this principle is declared by a high authority to be the principle which governs the whole process of Development as it is exhibited in the wonderful transformations through which Insects go. Sir J. Lubbock tells us * that whilst these transformations as a whole are in a sense the same in all cases, they differ widely in the rapidity with which different Organs are developed in different Insects; and he adds that the condition of those Organs at the time of birth, or hatching of the egg, depends mainly on the manner of life which the larva is "intended to lead." Those Organs are well developed which are requisite for immediate use in the larval state, whilst those other Organs which are destined for a future stage are present only in rudiments or in germ. We may be quite sure that the same principle has governed the development of the whole animal creation, and if so, we may be equally sure that rudimentary Organs are to be expected everywhere in Nature, and are everywhere open to the same interpretation.

It is, as we have seen, the accepted doctrine with the Biologists of Evolution that new Organs are never really new, but everywhere and always simply developments of some pre-exist-

* Transac. Linnæan Society, Vol. xxiv. On the Development of Chloëon.

ing structure. It is a necessary consequence of this doctrine that such developments must begin with stages anterior to the possibility of use, and in this stage they may easily be confounded with those which have become atrophied by disuse. The most prominent and startling example of this phenomenon which perhaps is now to be found in Nature, is the existence in the same great group of the Cetacea, or Whales, of rudimentary bones representing the pelvis, and the other bones of the hind limbs of terrestrial quadrupeds,—a fact to which we must now add the farther discovery that the muscles also which are appropriated to the movement of these hind limbs in the terrestrial Mammalia, are to be traced in the anatomy of the Whales in a like condition of complete dissociation from the possibility of use. It has been usual among the disciples of the Darwinian hypothesis to assume that in all cases these useless Organs are not rudiments but remains—not roots which may yet have the opportunity of flourishing, but branches of an old stem which has decayed and has left them as wrecks behind. It is needless to point out that both of these suppositions are equally consistent with the Theory of Evolution—both equally involving the idea that the most extensive changes in species, involving both form, and food, and habitat, are quite possibly within the range of development through ordinary generation. But if we assume that in all cases where such useless members are found, they are always remnants, and never germs—that they always represent members which were once in full development, and in actual use, and never represent members which are merely capable of development in the future,—then we are no nearer than we were before to the real Origin of Organic Structures. It obliges us to suppose that the ancestors of Whales were once terrestrial quadrupeds, and in that case we start with the conception of hind limbs, and of the Quadrupedal Mammal, fully formed and perfectly developed. Whereas, if we accept the possibility of useless Organs being the beginnings and rudiments of structures which are there because the Germ has always within it the tendency to produce them, then we catch sight of an idea which has the double advantage of going nearer to the Origin of Species, and of being in har-

mony with the analogy of natural operations as we see them now.

No one knew better than Mr. Darwin that the weakest part of his theory is that which assumes variations to be accidental, and the successful variations to be the mere "selected" survivors of thousands which have arisen and died because they did not happen to coincide with favoring conditions. Indeed he avowed that this part of his theory was merely provisional, and nothing more than a confession of our complete ignorance of any definite Law in the phenomena of Variation. Believing as I do in the Reign of Law in Nature, and that there is no established order of events which can possibly be accidental, I cannot doubt that if Species have been begun and established through birth and ordinary generation, the rise and establishment of every variety has followed a predetermined course, and the mould of every new Organ and every new development has been implicit in every Germ. We know this to be so within the limits of Specific Forms, in every existing ovum: and it is no more difficult to believe that the same principle holds good for every deviation from those Specific Forms which may lie or have lain in a more distant future. How it is so is, indeed, in the highest degree inconceivable. Solomon asks, "Is there any taste in the white of an egg?" But there is another question much more significant. Is there any structure in the white of an egg? None that can be detected by any human method of examination. Yet out of that material, by the application of nothing beyond a little heat, the most elaborate structure is developed along lines of growth which are rigorously predetermined. And if we see this to be the fact in the case of an egg, and in the case of every seed, where no mould is visible, it seems much more easy to conceive it in cases where the moulds of new Organs can be actually seen as rudimentary structures useless to the individual creature which contains them. And then it is always to be remembered that even if we suppose all visible rudiments of Organs to be invariably relics of the past, we know that some other set of Organs must have been on the rise as a substitute for those which were in course of atrophy and decay. If Whales, for example, are indeed descended from terrestrial quadrupeds which had a fully developed pelvis

and posterior limbs, then the new Organ fitted for the propulsion of the animal in water, which is almost exclusively the tail, must have existed first in germs, and then in stages of preparation, before its use was begun and before that use was perfected. In any case, therefore, we come back to the idea of all Organic growths being implicit in their respective Germs. It is quite true that in Nature as we now see it these Germs are always born from pre-existing Organisms. But our Reason tells us that this process must have had a beginning, and science, in so far as its evidence is available, indicates very clearly successive stages of creation,—and times comparatively recent when all existing genera began to be.

The dictum seems to be true now, "Omne vivum ab ovo." But the converse proposition, "Omne ovum ab vivo," would involve us in an Eternal Series with no Beginning. It can be true only in that transcendental sense in which we can affirm that every Germ must have come from some great primal Source and Fount of Life. But all reasoning and all evidence goes to establish the conception that each of these Germs has now, and has always had, its own fixed and predetermined line of march. In its wonderful, invisible, and incomprehensible structure, every Ovum does not grow up to the uses which are to be. We strain our imaginations to conceive the processes of Creation, whilst in reality they are around us daily. Perhaps if we had been present at the birth of some new animal Form we should have seen nothing very different from, and certainly nothing more wonderful than, we see now. It is only familiarity that has veiled their mystery. It is only thoughtlessness that makes us think that we are not even now in the middle of a truly Creative Work. It is most probable that at no stage of it, if we had been staring with all our eyes, and listening with all our ears, would we have seen or heard anything which is not to be seen and heard in the world around us. The first introduction of a Germ would probably have been invisible. From the Beginning Creation would have seemed to us a growth and not a manufacture. Nor is it conceivable that there should have been then a wider difference between the first Germs of things, and the Forms and Functions which were to be developed out of them, than the difference which in this re-

spect prevails in the existing world. For this difference in many cases amounts to the most absolute contrast, and extends to every feature which is recognizable either by the senses or the intellect. Nor is this contrast confined to cases in which fragments of matter apparently formless swell and grow into complicated structures. It extends to cases in which creatures apparently perfect, and which are certainly highly Organized, become changed in everything which constitutes their visible identity. When we think of the mystery involved in the metamorphoses of Insects and in the corresponding phenomena of alternate generation in other classes of the Animal Kingdom, we must see what unlimited possibilities of Creation lie open in methods which are in full operation round us. In the higher animals the development of Germs is carried on in vital and physical connection with the perfected Organism of the mother, and the cycle of changes which lead up to the completion of the parent Form is a cycle which thus appears to be wholly governed by the surrounding medium. But when we look at the metamorphoses of Insects, no such delusion is possible. A creature which to all appearance is fully formed, and which has led a separate and independent existence, suddenly lays itself to sleep. In that condition, without any food, —without any contact with any directing physical agency external to itself,—its Organization is wholly altered—its whole body is re-arranged—its old members dissolve and disappear, —new members emerge, and in a few days or weeks are perfected in form and in power. Moreover, that form and that power are both for uses which, so far as the creature's previous "experience" is concerned, are absolutely new.

With such "leaps" as this in the Creative Work going on in every field, and stream, and sea around us, we may have the utmost confidence that the same Work has involved the same principles through all time. From the beginning of it there has been no chance—none of its results have been attained by accident—none in Physics by the mere clash of Atoms—none in Vitality by the mere "struggle for existence." Existence has come before struggle, and not after it. There never has been "experience" till the faculties by which it is acquired have been first given and then set to work. There never has been any

"use" till the Organs have been formed by which service could be rendered. Creation and Evolution, therefore, when these terms have been cleared from intellectual confusion, are not antagonistic conceptions mutually exclusive. They are harmonious and complementary. In this aspect both conceptions are equally, thoroughly, and intensely anthropopsychic—both absolutely demanding as a condition of the facts being rendered intelligible that Utility should be recognized as an end before it can possibly have been made use of as a means. Under whatever cloud of words men may endeavor to conceal it, our recognition of this universal fact and law in the genesis of Organic Functions is the recognition of Mind by Mind,—the recognition by the human mind of operations which are intelligible to it only because they are operations having a close analogy with its own.

CHAPTER VIII.

MAN AS THE REPRESENTATIVE OF THE SUPERNATURAL.

THE denial and exclusion of what is called "The Supernatural" in our explanations of Nature, is the same doctrine in another form as the denial and exclusion of Anthropopsychism. The connection may not be evident at first sight, but it arises from the fact that the human Mind is really the type, and the only type, of that which men call the Supernatural. It would be well if this word were altogether banished from our vocabulary It is in the highest degree ambiguous and deceptive. It assumes that the system of "Nature" in which we live and of which we form a part, is limited to purely physical agencies linked together by nothing but mechanical necessity. There might indeed be no harm in this limitation of the word Nature if it could possibly be adhered to. But it is not possible to adhere to it, and that for the best of all reasons, because even inanimate Nature, as we habitually see it, and are obliged to speak of it, is not a System which gives us the idea of being governed and guided by mechanical necessity. No wonder men find it difficult to believe in the Supernatural, if by the Supernatural they mean any Agency which is nowhere present in the visible and intelligible Universe, or is not implicitly represented and continually reflected there. For indeed in this sense no Christian can believe in the Supernatural,—in a Creation from which the Creator has been banished, or has withdrawn Himself. On the other hand, if by the Supernatural we mean an Agency which, while ever present in the material and intelligible Universe, is not confined to it, but transcends it, then indeed the difficulty is not in the believing of it, but in the disbelieving of it. No man can really hold that the Material System which is visible or intelligible to us is anything more than a fragment or a part. No man can believe that its existing arrangements of Matter and of Force are self-caused, self-originated and self-sustained. It is

not possible, therefore, so to "crib, cabin and confine" our conceptions of Nature as to exclude elements which essentially belong to what is called the Supernatural. And there is another reason why it is impossible to adhere to such conceptions of the Natural, and that is, that it would compel us to exclude the Mind of Man, and indeed the lesser minds of all living things, from our scientific definition of Nature, and to establish an absolute and rigorous separation between all of these and the world in which they move and act. We have seen not only how impracticable such a separation is, but how false it is to the facts of science. The same condemnation must fall on every conception of the Universe which assumes this separation as not only important but fundamental. Yet this is the very separation on which those philosophers absolutely depend who condemn what they call the Supernatural in our conceptions and explanations of the world. And in the interest of their own argument they are quite right in keeping to this separation as indispensable for their purpose. In order to exclude from Nature what they call the Supernatural, it is absolutely necessary that they should in the first place exclude Man. If Nature be nothing but Matter, Force, and Mechanical Necessity, then Man belongs to the Supernatural, and is indeed the very embodiment and representation of it.

Accordingly this identification of Man with the Supernatural is necessarily and almost unconsciously involved in language which is intended to be strictly philosophical, and in the most careful utterances of our most distinguished scientific men. Thus Professor Tyndall, in his Belfast Address to the British Association, uses these words: "Our earliest historic ancestors fell back also upon experience, but with this difference, that the particular experiences which furnished the weft and woof of their theories were drawn, not from the study of Nature, but from what lay much closer to them—the observation of men." Here Man is especially contradistinguished from Nature, and accordingly we find in the next sentence that this idea is connected with a condemnation of the error of seeing ourselves—that is, the Supernatural in Nature. "Their theories," the Professor goes on to say, "accordingly took an anthropomorphic form." Further on, in the same Address, the same antithesis is still more

distinctly expressed, thus: "If Mr. Darwin rejects the notion of creative power acting after human fashion, it certainly is not because he is unacquainted with the numberless exquisite adaptations on which the notion of a supernatural artificer is founded." Here we see that the idea of "acting after human fashion" is treated as synonymous with the idea of a "supernatural artificer;" and the same identification may be observed running throughout the language which is commonly employed to condemn what is sometimes called Anthropomorphism and at other times is called the Supernatural.

The two propositions, therefore, which are really involved in the thoroughgoing denial of Anthropopsychism and the Supernatural are the following: 1st, that there is nothing except Man which is above or outside of mere Matter and Force in Nature as we see and know it; 2d, that in the System of Nature as thus seen and known, there are no phenomena due to Mind having any analogies with our own.

Surely these propositions have been refuted the moment the definition of them has been attained. We have only to observe, in the first place, the strange and anomalous position in which it places Man. As regards at least the higher faculties of his mind, he is allowed no place in Nature, and no fellowship with any other thing or any other Being outside of Nature. He is absolutely alone—out of all relation with the Universe around him, and under a complete delusion when he sees in any part of it any mental homologies with his own Intelligence, or with his own Will, or with his own Affections. Does this absolute solitariness of position as regards the higher attributes of Man—does it sound reasonable, or possible, or consistent with some of the most fundamental conceptions of science? How, for example, does it accord with that great conception whose truth and sweep become every day more apparent—the Unity of Nature?

How can it be true that Man is so outside of that Unity that the very notion of seeing anything like himself in it is the greatest of all philosophical heresies? Does not the very possibility of science consist in the possibility of reducing all natural phenomena to purely natural conceptions, which must be related to the Intellect of Man when they are worked out and

apprehended by it? And if, according to the latest theories, Man is himself a Product of Evolution, and is, therefore, in every atom of his Body and in every function of his Mind a part and a child of Nature, is it not in the highest degree illogical so to separate him from it as to condemn him for seeing in it some image of himself? If he is its product and its child, is it not certain that he is right when he sees and feels the indissoluble bonds of unity which unite him to the great System of things in which he lives?

This fundamental inconsistency in the Agnostic philosophy becomes all the more remarkable when we find that the very men who tell us that we are not One with anything above us, are the same who insist that we are One with everything beneath us. Whatever there is in us or about us which is purely animal we may see everywhere; but whatever there is in us purely intellectual and moral, we delude ourselves if we think we see it anywhere. There are abundant homologies between our bodies and the bodies of the beasts, but there are no homologies between our minds and any Mind which lives and manifests itself in Nature. Our livers and our lungs, our vertebræ and our nervous systems, are identical in origin and in function with those of the living creatures round us; but there is nothing in Nature or above it which corresponds to our Forethought, or Design, or Purpose—to our love of the Good or our admiration of the Beautiful—to our indignation with the wicked, or to our pity for the suffering and the fallen. I venture to think that no system of philosophy that has ever been taught on Earth lies under such a weight of antecedent improbability; and this improbability increases in direct proportion to the success of science in tracing the Unity of Nature, and in showing step by step how its laws and their results can be brought more and more into direct relation with the Mind and Intellect of Man.

Let us test this philosophy from another point of view, and see how far it is consistent with our advancing knowledge of those combinations of natural Force by which the system of the physical Universe appears to be sustained.

We may often see in the writings of our physical teachers in the present day reference made to a celebrated phrase of the

old and abandoned school of Aristotelian physics—a phrase invented by that old school to express a familiar fact—that it is extremely difficult, if not absolutely impossible, to produce a perfect vacuum—that is to say, a space which shall be absolutely empty. The phrase was this: "Nature abhors a vacuum." It is now continually held up as a perfect example and type of the old habit of thought which vitiates all true physical reasoning. Now let us observe what this error is. As a forcible and picturesque way of expressing a physical truth—that the difficulty of producing a vacuum is extreme, that Nature sets, as it were, her face against our doing it—the phrase is a good one, and conveys an excellent idea of the general fact. Sir W. Grove says of it, that it is "an aphorism, which, though cavilled at and ridiculed by the self-sufficiency of some modern philosophers, contains in a terse though somewhat metaphorical form the expression of a comprehensive truth." But there is this error in the phrase (if indeed it was or ever could be literally understood)—that it gives for the general fact a wrong cause, inasmuch as it ascribes to the material and inanimate Forces of Nature, whose simple pressures are concerned in the result, certain dispositions that are known to us as affections of Mind alone. In short, it ascribes to the mere elementary Forces of Matter—not to a living Agency using these as tools, but to mere Material Force—the attributes of Mind.

Now it is well worthy of remark that, so far as this error is concerned, the language of physical science is full of it—steeped in it; and that in this sense it is chargeable with a kind of Anthropomorphism which is really open to the gravest objection. To see Mind in Nature, or, according as Nature may be defined, to see Mind outside of Nature, acknowledging it to be Mind, and treating it as such—this is one thing—and this is the true and legitimate Anthropopsychism which some physicists denounce. But to see Mind in Material Forces alone, and to ascribe its attributes to them—this is equally Anthropomorphism, but a form of it which is indeed open to all the objections they express. This, nevertheless, is the Anthropomorphism which gives habitually its coloring to their thoughts and its spirit to their language.

Let me explain what I mean by some examples. I will take,

first, the theory of Development, or the derivative hypothesis, which, as applied to the history of Organic Life, is now accepted by a large number of scientific men, if not as certainly true, at least as an hypothesis which comes nearer than any other to the truth. Whether that theory be true or not it is a theory saturated throughout with the ideas of utility and fitness, and of adaptation, as the governing principles and causes of the harmony of Nature. Its central conception is, that in the history of Organic Life changes have somehow always come about exactly in proportion as the need of them arose. But how is it that the laws of growth are so correlated with utility that they should in this manner work together? Why should varied and increasing utility operate in the requisite direction of varied and increasing developments? The connection is not one of logical necessity. Not only can we conceive it otherwise, but we know that it is otherwise beyond certain bounds and limits. It is not an universal law that organic growths arise in proportion to all needs, or are strengthened by all exertion. It is a law prevailing only within certain limits; and it is not possible to describe the facts concerning it without employing the language which is expressive of mental purpose.

Accordingly, I have pointed out in a former work * that Mr. Darwin himself does use this language perpetually, and to an extent far exceeding that in which it is used by almost any other natural philosopher. Some writers who see in his theory nothing but its materialistic aspects have taken alarm at this language, and have warned him of its dangerous significance. But he never—to the last—accepted a warning that would have hindered him in that faithful interpretation of Nature which consisted in simply expressing what he saw. Accordingly in none of his works has this teleological tendency of language been more marked as an inevitable necessity of thought than in one of his very latest contributions to science. "The Movements of Plants" have been traced by him through hours, and days, and months of the most patient and accurate observation. It is found as a fundamental fact that the growth of all plants is affected along lines of movement which may be described as spiral or screwing, and to this fundamental fact the term "Cir-

* "Reign of Law," Chap. I.

cumnutation" has been applied. Now the physical cause of this movement is at least obscure, but, on the other hand, the purposes which it subserves are not obscure at all. All that can be said about the physical cause is, that "it probably arises from changes in the turgescence of the cells" * taking place alternately upon opposite sides of the growing part. But this is little more than a re-statement of the fact in another form of words. The increased turgescence of the cells on one side means or involves increased growth on that side. The other side remaining comparatively still, necessarily exerts a pull upon the moving side, as an anchor exerts a pull upon the swinging of a ship. This pull turns or twists the moving side towards itself, and thus a constant twisting or spiral motion is established in all growing vegetation.

But how comes it that the turgescence of cell-growth should be unequal and alternate? It is no physical explanation of circumnutation merely to state its essential condition as a fact. Mr. Darwin calls the changes in turgescence "spontaneous"—that is to say, they are innate and their causes are unknown. But now, when we come to the uses of circumnutation, we find them to be clear, definite, and almost infinitely various. By means of it the roots of plants seek the ground,—pierce the soil,—twist themselves away from obstacles, and run in the direction of moisture or of nourishment. By the same means the upward shoots from germs which are buried underground curl themselves into an arch so that with greater strength and with greater mechanical advantage they can burst through the substance and the hardened surface of the soil. By the same twisting movements they can face the Sun, or they can close their petals against cold and storm—they can lay their leaves in a direction least exposed to frosts and blights—they can sleep and they can wake—they can avoid objects that hinder them from the light—they can seek the shade from excessive glare—they can rear their heads alone, or they can clasp and entwine themselves round necessary supports.

Every one who has observed even cursorily the growth of plants must have seen cases in which they seem not only to have the senses of a living animal, but to have powers of self-adjust-

* Page 663.

ment and of structural self-adaptation which no animal possesses. It is common, for example, to see a tree which has been planted on the edge of a steep bank throw out roots of extraordinary size and strength upon the side which needs special support. The same versatility of powers is visible in a thousand other cases. Mr. Darwin has traced it through an immense variety of applications, and in describing it he sees, and he expresses in vivid language, the mental attributes of Purpose which it embodies. He speaks of the roots of plants "thus following with unerring skill a line of least resistance." He speaks of a "curious special contrivance for bursting the seed-coats whilst beneath the ground—namely, a peg at the base of the hypocotyl projecting at right angles which holds down the lower half of the seed-coats, whilst the growth of the arched part of the hypocotyl lifts up the upper half and thus splits them in twain." * He speaks of circumnutating movements "being so arranged that the blade stands vertically during the night, reassuming its former position on the following morning." † He even speaks of the tip of a root "perceiving the air to be moister on one side than on the other, and transmitting an influence to the adjoining part which leads towards the source of moisture." ‡ Finally he says that "in almost every case (in plant life) we can clearly perceive the final purpose or advantage of the several movements."

Mr. Darwin does not use this language with any theological purpose nor in connection with any metaphysical speculation. He uses it simply and naturally for no other reason than that he cannot help it. The Correlation of Natural Forces so adjusted as to work together for the production of use in the functions, for the enjoyments, and for the beauty of Life—this is the central idea of his system; and it is an idea which cannot be worked out in detail without habitual use of the language which is moulded on our own consciousness of the mental powers by which all our own adjustments are achieved. This is what, perhaps, the greatest Observer that has ever lived cannot help observing in Nature; and so his language is

* "Movements of Plants," p. 556.
† Ibid., p. 561.
‡ Ibid., p. 572.

thoroughly anthropopsychic. Seeing in the methods pursued in Nature a constant embodiment of his own intellectual conceptions, and a close analogy with the methods which his own mind recognizes as "contrivance," he rightly uses the forms of expression which convey the work of Mind. "Rightly," I say, provided the full scope and meaning of this language be not repudiated. I do not mean that naturalists should be always following up their language to theological conclusions, or that any fault should be found with them when they stop where the sphere of mere physical observation terminates. But those who seek to remodel philosophy upon the results of that observation cannot consistently borrow all the advantage of anthropopsychic language, and then denounce it when it carries them beyond the point at which they desire to stop. If in the words which we recognize as best describing the facts of Nature there be elements of meaning to which their whole force and descriptive power is due, then these elements of meaning must be admitted as essential to a just conception and to a true interpretation of what we see. The analogies which help us to understand the works of Nature are not, as it were, foreign material imported into the facts, but are part of these facts, and constitute the light which shines from them upon the Intellect of Man. In exact proportion as we believe that Intellect to be a product of Nature, and to be united to it by indissoluble ties of birth, of Structure, and of Function, in the same proportion may we be sure that its Organs of vision are adjusted to the realities of the world, and that its innate perceptions of analogy and resemblance have a close relation to the truth. The theory of Development is not only consistent with teleological explanation, but it is founded on teleology, and on nothing else. It sees in everything the results of a System which is ever acting for the best, always producing something more perfect or more beautiful than before, and incessantly eliminating whatever is faulty or less perfectly adapted to every new condition. Professor Tyndall himself cannot describe this System without using the most intensely anthropopsychic language: "The continued effort of animated nature is to improve its conditions and raise itself to a loftier level." *

* Belfast Address.

Again I say, it is quite right to use this language, provided its ultimate reference to Mind be admitted and not repudiated. But if this language be persistently applied and philosophically defended as applicable to material Force, otherwise than as the instrument and tool of Mind, then it is language involving far more than the absurdity of the old mediæval phrase that "Nature abhors a vacuum." It ceases to be a mere picturesque expression, and becomes a definite ascription to Matter of the highest attributes of Mind. If Nature cannot feel "abhorrence," neither can it cherish "aspirations." If it cannot hate, neither can it love, nor contrive, nor adjust, nor look to the future, nor think about "loftier levels" there.

Professor Tyndall in the same Address has given us an interesting anecdote of a very celebrated man whom the world has lately lost. He tells us that he heard the great Swiss naturalist Agassiz express an almost sad surprise that the Darwinian theory should have been so extensively accepted by the best intellects of our time. And this surprise seems again in some measure to have surprised Professor Tyndall. Now it so happens that I have perhaps the means of explaining the real difficulty felt by Agassiz in accepting the modern theory of Evolution. I had not seen that distinguished man for nearly five-and-thirty years. But he was one of those gifted Beings who stamp an indelible impression on the memory; and in 1842 he had left an enthusiastic letter on my father's table at Inveraray on finding it largely occupied by scientific works. Across that long interval of time I ventured lately to seek a renewal of acquaintance, and during the year which proved to be the last of his life, I asked him some questions on his own views on the history and origin of Organic Forms. In his reply Agassiz sums up in the following words his objection to the theory of Natural Selection as affording any satisfying explanation of the facts for which it professes to account:—"The truth is, that Life has all the wealth of endowment of the most comprehensive mental manifestations, and none of the simplicity of physical phenomena."

Here we have the testimony of another among the very greatest of modern Observers that wealth—immense and immeasurable wealth—of Mind is the one fact above all others

observable in Nature, and especially in the adaptations of Organic Life. It was because he could see no adequate place or room reserved for this fact in the theory of Development that Agassiz rejected it as not satisfying the conditions of the problem to be solved. Probably this may be the fault of the forms in which it has been propounded, and of the strenuous endeavors of many of its supporters to shut out all interpretations of a higher kind. But of this we may be sure, that if men should indeed ultimately become convinced that species have been all born just as individuals are now all born, and that such has been the universal method of Creation, this conviction will not only be found to be soluble, so to speak, in the old beliefs respecting a creative Mind, but it will be unintelligible and inconceivable without them, so that men in describing the history and aim and direction of Evolution, will be compelled to use substantially the same language in which they have hitherto spoken of the history of Creation.

Mr. Mivart has indeed remarked in a very able work,* as Mr. Wallace had remarked before him, that the teleological language used so freely by Mr. Darwin and others is purely metaphorical. As I have already elsewhere † dealt with this criticism, I need only repeat here, what cannot be insisted upon too firmly, that even if it were strictly accurate, it had no adverse bearing upon the evidence which this language of so-called metaphor involves. It is not strictly accurate because there is no real element of metaphor except where the outward forms of the human Personality are ascribed to Nature. Nature has no hands and no brain; but these members, even in Man, are regarded as "Organs," and as nothing else—the visible representatives of invisible powers: and where the names of these organs, and of such like, are not figuratively used in respect to Nature,—where nothing is expressed but the facts of teleological adaptation, there is not, properly speaking, any metaphor at all. But putting this aside for the moment, and granting that in the description of the invisible phenomena of Mind it is difficult to avoid all reference to the outward and visible forms in which these phenomena are manifested in us—

* "Genesis of Species."

† "Reign of Law," Chap. I.

even so, this metaphorical element does not affect the evidence supplied by the inevitable phraseology of all natural philosophers when it is their business to describe what they see in Nature. For what purpose are metaphors used? Is it not as a means of making plain to our own understandings the principle of things, and of tracing amid the varieties of phenomena the essential Unities of Nature? In this sense all Language is full of metaphor, being indeed composed of little else. That is to say, the whole structure and architecture of Language consists of words which transfer and apply to one sphere of investigation ideas which have been derived from another, because there also the same ideas are seen to be expressed, only under some difference of form. Accordingly, when naturalists, describing plants or animals, use the language of Contrivance to describe the Adaptations of Function, they must use it because they feel it to be a help in the understanding of the facts. When, for example, we are told that flowers are constructed in a peculiar manner, "in order that" they may catch the proboscces of Moths or the backs of Bees, and that this adaptation again is necessary "in order that" these insects should carry the fertilizing pollen from flower to flower, nothing more may be immediately intended by the writer than that all this elaborate mechanism does as a matter of fact attain this end, and that it may be fitly described "as if" it had been arranged "in order that" these things might happen. But this use of language is none the less an acknowledgment of the truth that the facts of Nature are best brought home and explained to the Understanding, and to the Intelligence of Man, by stating them in terms of the relation which they obviously bear to the familiar operations of our own Mind and Spirit.

And this is the invariable result of all physical inquiry. In this sense Nature is essentially anthropopsychic. Man sees his own Mind everywhere reflected in it—his own, not in quantity but in quality—his own fundamental attributes of Intellect, and, to a wonderful and mysterious degree, even his own methods of operation.

It is really curious and instructive to observe how even those who struggle hardest to avoid the language of Anthropopsychism in the interpretations of Nature are compelled to make

use of the analogies of our own mental operations as the only possible exponents of what we see. Let us look, for example, at the definition of Life given by Mr. Herbert Spencer. It is a very old endeavor to construct such definitions, and not a very profitable one: inasmuch as Life is only known to us as itself, and all attempts to reduce it to other conceptions are never anything but mere playing with empty words. But it is not without instruction to observe that Mr. Spencer's laborious analysis comes to this: "Life is the continuous Adjustment of internal relations to external relations." Bare, abstract, and evasive of the most characteristic facts as this formula is, it does contain at least one definite idea as to how Life comes to be. Life is an "Adjustment." This is a purely anthropopsychic conception, conveying the idea of that kind of co-ordination between different powers or elements which is the result of constructive Purpose. I have already pointed out in a former chapter that all combinations are not Adjustments. The whole force and meaning of the word consists in its reference to intentional arrangement. No combination can properly be called an Adjustment if it be purely accidental. When, therefore, Life is represented as an Adjustment, this is the mental image which is reproduced; and in so far as it does reproduce this idea, and does consciously express it, the formula has at least some intelligible meaning. If, indeed, it has any plausibility or approach to truth at all, this is the element in it from which this plausibility is derived.

We may take another case. Mr. Matthew Arnold, a writer of great distinction both as a critic and as a poet, has invented a new phrase for that conception of a Divine Being which alone, as the ultimate residuum of thought, can be justified by such evidence as we possess. And what is that phrase? "The Eternal, not ourselves, which makes for Righteousness." It is evident that whatever meaning there may be in this artificial and cumbrous phrase is entirely derived from its Anthropopsychism. An Agency which "makes for" something—that something, too, being in the future, and being also in itself an abstract moral and intellectual conception—what can such an agency be conceived to be? "Making for" an object of any kind is a purely human image—an image, too, derived prima-

rily not from the highest efforts of human Will, but from those which are represented in the exercises of the Body, and the skill with which, in athletic contentions, some distant goal may be reached and won. Such is the attempt of a very eminent man to instruct us how we are to think of God without seeing in Him or in His world anything analogous to our own thought and work.

Nor is it wonderful that this attempt should fail, when we consider what it is an attempt to do—to establish an absolute separation between Man and Nature; to set up Man as something above Nature, and outside of it; and yet to affirm that there is no other Being, and no other Intelligence, in a like position. And if anything can render this attempt more unreasonable, it must be the further attempt to reach this result through science,—science, the very possibility of which depends on, and consists in, the possibility of reducing all natural phenomena within the terms of human thought, so that its highest generalizations are always the most abstract intellectual conceptions. Science is the systematic knowledge of relations, but that which perceives relations must be itself related. All explanation consists in nothing else than in establishing the relation which some order of external facts bears to some corresponding order of Perception and of Thought; and it follows from this truth, that the highest explanations of phenomena must always be those which establish such relations with the highest faculties of our nature. Professor Tyndall, in another part of his Belfast Address, like many other writers of the present day, goes the length of saying that the great test of physical truth is what may be called its "representability,"—that is to say, the degree in which a given physical conception can, from the analogies of experience, be represented in thought. But if our power of picturing a physical fact distinctly be indeed an indication of a true physical analogy, how much more distinctly than any physical fact can we picture the characteristic workings of our own mental constitution? Yet these are the conceptions which, we are told, we are not to cherish, because they are anthropomorphic—or, in other words, because of the very fact that they are so familiar to us, and that their mental representability is so complete.

Some, indeed, of our physical teachers, conscious of this necessary and involuntary Anthropopsychism of human thought and speech, struggle hard to expel it by inventing phrases which shall as far as possible avoid it. But it is well worthy of observation, that in exact proportion as these phrases do avoid it, they become incompetent to describe fully the facts of science. For example, let us take again those incipient changes in the substance of an egg by which the Organs of the future animal are successively laid down—changes which have all reference to a purely purposive adaptation of that substance to the future discharge of separate and special functions. I have already referred* to the fact that these changes are now commonly described as "differentiations," an abstract expression which simply means the establishment of differences, without any reference to the peculiar nature of those differences, or their relations to each other and to the whole. But the inadequacy of this word to express the facts is surely obvious. The processes of dissolution and decay are processes of "differentiation" quite as much as the process of growth and adaptation to living functions. Blood is "differentiated" just as much when, upon being spilt upon the ground, it separates into fibrin, serum, and corpuscles, or finally into its inorganic elements, as when, circulating in the vessels, it bathes and feeds the various tissues of the living Body. But these two operations—these two kinds of "differentiation"—are not only distinct, but absolutely opposite in their nature, and there does not seem to be much light in that philosophy which insists on using the same formula of expression to describe them both. It is a phrase which empties the facts, as we can see and know them, of all that is special in our knowledge of them.

There is another conspicuous example of the same misuse of language which si common in connection with phenomena of the very highest interest and importance in the science of Physiology. I refer to the regular formula of words which is almost always employed to designate and define the automatic actions of the animal frame. The set phrase for this class of movement is "Reflex Action." Now this phrase is not only

* Chap. I. p. 25.

wholly incompetent from weakness and insufficiency to convey any adequate conception of the facts as they exist in Nature, but worse than this—it involves conceptions and suggests analogies which are altogether misleading and erroneous. "Reflex" etymologically means of course "turned back" or "bent back." And this is the sense in which it is properly and accurately applied to such phenomena, for example, as the reflection of Light or of Radiant Heat. In these cases the Radiant Energy impinges upon some surface, and is turned or bent back from it so as to take a new path in a different direction. But the essential idea in all such cases is that in both paths—the path of incidence, and the new path of reflection—the original Energy is the same in kind. The light which strikes the surface of the Sea is nothing but light when it glances off the liquid surface and appears as a vivid gleam upon the horizon. Some portions indeed of a beam may be lost or absorbed in the process of reflection, but no new element is added. It comes to the reflecting surface as ethereal undulations, and it leaves it again as ethereal undulations, and as nothing else.

Now, there is no analogy whatever between this kind of movement or of action and the highly complex movements which result automatically in the living frame of animals from the stimulation of some external nerve. It is quite true that some movement goes inward to the brain, or to some subordinate nervous centre, and that some movement comes back from that centre in return. But the movement which goes is not the same movement which returns. The two movements are not only far from being identical, but they are not even the same in kind. We might as well describe it as "reflex action" when some great fleet weighs anchor and puts out to sea in response to a signal from the flagship; or when gunners enveloped in a cloud of smoke aim their artillery by directions from the top. These are no random similes. They are perhaps the closest analogies which could be chosen to illustrate the wonders which are performed by the animal Organism under some simple stimulus applied to the termination of a nerve. In itself that stimulus may be said to be a signal and nothing more. The reading of it involves the interpretation of a Code, and the obeying of the signal by responsive action involves the simul-

taneous and the co-ordinated action of a host of living structures. In all such cases the action which begins is not the same kind of action as that which follows. The initial movement is one which is uniform and simple, having no other office than to rouse, and to suggest or order. The resulting movements are multiform and complex, with all the functions of interpretation and of obedience. There is nothing whatever here corresponding to the mere bendings and repetitions of physical reflection.

If there be any purely and merely physical relation between the tremors of a nerve and the complicated movements which arise in answer, it is a relation not of identity or even of likeness, but a relation, on the contrary, of such essential difference as to correspond better with the idea of some total transmutation. But even this is a feeble image, inasmuch as it retains a trace of the idea of some underlying and substantial sameness. But the facts of Nature demand imperatively that we should admit into our conception of the results which are concealed under the words Reflex Action, certain elements other than those of mere mechanical motion, however changed in direction or transmuted in form. In observing the effects, and in reading accounts of the effects, of what is called "Reflex Action" in the animal economy, and before I had submitted the phrase to strict analysis, I had long felt that sense of confusion which results from the presentation to the Mind of false analogies, of incompetent description, and of formulæ of expression which, pretending to be scientific, are in reality nothing but the wilful shutting-out of knowledge. It is, however, most satisfactory to find that in one of the latest and best text-books of Physiology, that of Professor Forster of Cambridge, there is a full confession of the incompetency of such words as "Reflex Action" to describe the relation between the stimulus of an "afferent" nerve and the "efferent" movements which are carried into responsive pre-adjusted action. The two classes of impulse and of resulting movement are justly described as really "incommensurate." And whilst the purely mechanical or physical relation of mere bending or turning is thus condemned not only as an inadequate, but as essentially a false image of the real relation which subsists

between the antecedent and the consequent phenomena, that real relation is described and admitted in the following remarkable passage:—"In the more complex reflex actions of the brainless frog and in other cases, the relation is of such a kind as that the resulting movement bears *an adaptation* to the stimulus; the foot is withdrawn from the stimulus, or the movement is calculated to push or wipe away the stimulus. In other words, a certain purpose is evident in the reflex action."*

Here we have the formula of expression which is almost universally employed by Physiologists to describe some of the most important phenomena of their science, authoritatively detected and exposed; whilst the mental element of pre-adjustment and adaptation, which such phrases are invented to avoid and to conceal, is brought out as the most prominent and characteristic feature in the scientific appreciation and description of facts.

It is possible, no doubt, by artifices of language similar to that which has been here exposed, to deprive the facts of Nature—or at least appear to deprive them—of their highest significance. More foolish than the fabled Ostrich, we may try to shut our eyes against our own perceptions, or we may refuse to register them in our language—resorting, for the sake of evasion, to some juggleries of speech. "Potential existence" is another of those vague abstract conceptions which may be, and is, employed for a like purpose. It may be applied indiscriminately to a mere slumbering force, or to an unfulfilled intention, or to an undeveloped mental faculty, or to an elaborate preparation of foresight and design. If we desire to take refuge from the necessity of forming any distinct conceptions, such phrases are eminently convenient for the purpose, whilst under cover of them we may cheat ourselves into the belief that we have got hold of some definite idea, and perhaps even of an important truth.

All who are puzzled and perplexed by the prevalent teaching on these high matters should subject the language in which it is conveyed to a careful, systematic, and close analysis. It will be found to fall within one or other of these three classes:—First, there is the phraseology of those who, without

* "Text-Book of Physiology," Chap. III. p. 117.

any thought either of theological dogma or of philosophical speculation, are, above all things, observers, and who describe the facts they see in whatever language appears most fully and most naturally to convey what they see to others. The language of such men is what Mr. Darwin's language almost always is—eminently teleological and anthropopsychic. Next, there is the language of those who purposely shut out this element of thought, and condemn it as unscientific. The language of this class is full of the vague abstract phrases to which I have referred—"differentiation"—"molecular change"—"harmony with environment," and others of a like kind—phrases which, in exact proportion to their abstract character, are evasive, and fall short of describing what is really seen. Lastly, we have the language of those who habitually ascribe to Matter the properties of Mind; using this language not metaphorically, like the old Aristotelians whom they despise, but literally—declaring that Mind, as we know it, must be considered as having been contained "potentially" in Matter, and was once nothing but a cosmic vapor or a fiery cloud. Well may Professor Tyndall call upon us "radically to change our notions of Matter," if this be a true view of it; for in this view it becomes equivalent to "Nature" in that largest and widest interpretation to which I referred at the close of the last chapter—viz., that in which Nature is understood as the whole System of things in which we live, and of which we form apart. But if this philosophy be true, let us at least cease to condemn, as the type of all absurdity, the old mediæval explanations of material phenomena, which ascribe to them affections of the Mind. If Matter be so widened in meaning as to be the mother and scource of Mind, it must surely be right and safe enough to see in material things those dispositions and activities which are said to be nothing but its product in ourselves.

The truth is, that this conception of Matter and of Nature, which is associated with vehement denunciations of Anthropomorphism, is itself founded on nothing else but Anthropomorphism pushed to its very farthest limit. It is entirely derived from and founded on the fact that Mind, as we see it in ourselves, is in this world inseparably connected with a mate-

rial Organism, and on the further assumption that Mind is inconceivable or cannot be inferred except in the same connection. This would be a very unsafe conclusion even if the connection between our Bodies and our Minds were of such a nature that we could not conceive the separation of the two. But so far is this from being the case, that, as Professor Tyndall most truly says, "it is a connection which we know only as an inexplicable fact, and we try to soar in a vacuum when we seek to comprehend it." The universal testimony of human Speech—that sure record of the deepest metaphysical truths—proves that we cannot but think of the Body and the Mind as separate—of the Mind as our proper selves, and of the Body as indeed external to it. Let us never forget that Life, as we know it here below, is the antecedent or the cause of Organization, and not its product; that the peculiar combinations of Matter which are the homes and abodes of Life are prepared and shaped under the control and guidance of that mysterious Power which we know as Vitality; and that no discovery of science has ever been able to reduce it to a lower level, or to identify it with any Purely material Force. And, lastly, we must remember that even if it be true that Life and Mind have some inseparable connection with the Forces which are known to us as material, this would not make the supreme agencies in Nature, or Nature as a whole, less anthropopsychic, but greatly more; so that it would, if possible, be even more unreasonable than it is now to condemn Man when he sees in Nature a Mind having real analogies with his own.

And now what is the result of this argument—what is its scope and bearing? Truly it is a very wide scope indeed—nothing less than this: that nothing in Philosophy, in Theology, in Belief, can be reasonably rejected or condemned on the sole ground that it is anthropopsychic. That is to say, no adverse presumption can arise against any Conception, or any Idea, or any Doctrine on the mere ground that it rests on the analogies of Human Thought. This is a position—purely negative and defensive though it be—from which we cannot be dislodged, and which holds under its destructive fire a thousand different avenues of attack.

But this is not all. Another result of the same argument is to

establish a presumption the other way. All the analogies of Human Thought are in themselves analogies of Nature, and in proportion as they are built up or are perceived by Mind in its higher attributes and work, they are part and parcel of natural truth. Man—he whom the Greeks call Anthropos, because, as it has been supposed, he is the only Being whose look is upwards—Man is a part of Nature, and no artificial definitions can separate him from it. And yet in another sense it is true that Man is above Nature—outside of it; and in this aspect he is the very type and image of the "Supernatural." The instinct which sees this image in him is a true instinct, and the consequent desire of atheistic philosophy to banish Anthropo-psychism from our conceptions is dictated by an obvious logical necessity. But in this necessity the system is self-condemned. Every advance of science is a new testimony to the supremacy of Mind, and to the correspondence between the Mind of Man and the Mind which is supreme in Nature. Nor yet will it be possible, in the face of science, to revive that Nature-worship which breathes in so many of the old Religions of Mankind. For in exalting Mind, science is ever making plainer and plainer the inferior position of the purely physical aspects of Nature—the subordinate character of what we know as Matter and material Force. Has not science, for example, even in these last few years, rendered forever impossible one of the oldest and most natural of the Idolatries of the world? It has disclosed to us the physical constitution of the Sun—that great heavenly body which is one of the chief proximate causes of all that we see and enjoy on Earth, and which has seemed most naturally the very image of the God-head to millions of the human race. We now know the Sun to be simply a very large globe of solid and of gaseous matter, in a state of fierce and flaming incandescence. No man can worship a ball of fire, however big; nor can he feel grateful to it, nor love it, nor adore it, even though its beams be to him the very light of life. Neither in it, nor in the mere Physical Forces of which it is the centre, can we see anything approaching to the rank and dignity of even the humblest human heart. "What know we greater than the Soul?" It is only when we come to think of the co-ordination and adjustment of these physical Forces as

part of the mechanism of the heavens—it is only, in short, when we recognize the mental—that is, the anthropopsychic—element, that the Universe becomes glorious and intelligible, as indeed a Cosmos: a System of Order and Beauty adapted to the various ends which we see actually attained, and to a thousand others which we can only guess. No philosophy can be true which allows that we see in Nature the most intimate relations with our intellectual conceptions of Space and Time and Force and Numerical Proportion, but denies that we can ever see any similar relation with our conceptions of Purpose and Design, or with those still higher conceptions which are embodied in our sense of Justice and in our love of Righteousness, and in our admiration of the "quality of Mercy." These elements in the Mind of Man are not less certain than others to have some correlative in the Mind which rules in Nature. Assuredly, in the supreme Government of the Universe these are not less likely than other parts of our mental constitution to have some part of the natural System related to them—so related that the knowledge of that System shall be at once their interpretation and fulfilment. Neither brute Matter nor inanimate Force can supply either the one or the other. If there be one truth more certain than another, one conclusion more securely founded than another, not on Reason only, but on every other Faculty of our nature, it is this—that there is nothing but Mind that we can respect; nothing but Heart that we can love, nothing but a perfect combination of the two that we can adore.

And yet it cannot be denied that among the many difficulties and the many mysteries by which we are surrounded, perhaps the greatest of all difficulties and the deepest of all mysteries concerns the limits within which we can, and beyond which we cannot, suppose that we bear the image of Him who is the source of Life. It seems as if, on either side, our thoughts are in danger of doing some affront to the Majesty of Heaven—on the one hand, if we suppose the Creator to have made us with an intense desire to know Him, but yet destitute of any faculties capable of forming even the faintest conception of His nature, on the other hand, if we suppose that creatures such as (only too well) we know ourselves to be, can image the High and the *Holy* One who inhabiteth Eternity. Both these aspects of the

truth are vividly represented in the language of the great Prophets of Humanity who "at sundry times and in divers manners" have spoken most powerfully to the world upon Divine things. On the one hand we have such strong but simple images as those which represent the Almighty as "walking in the garden in the cool of the day," or as speaking to the Jewish lawgiver "face to face, as a man speaketh with his friend," on the other hand we have the solemn and emphatic declaration of St. John that "no man hath seen God at any time." In the sublime poetry of Job we have at once the most touching and almost despairing complaints of the inaccessibility and inscrutability of God, and also the most absolute confidence in such a knowledge of His character as to support and justify unbounded trust. In the Psalms we have these words addressed to the wicked as conveying the most severe of all rebukes, "Thou thoughtest that I was altogether such an one as thyself."

And perhaps this word "altogether" indicates better than any other the true reconciliation of apparent contradictions. In the far higher light which Christianity claims to have thrown on the relations of Man to God, the same solution is in clearer terms presented to us. "Knowing in part and prophesying in part," "Seeing through a glass darkly," and many other forms of expression, imply at oncet he reality and yet the partial character of the truths which on these high matters our faculties enable us to attain. And this idea is not only consistent, but is inseparably connected with that Sense of Limitation which we have already seen to be one of the most remarkable and significant facts connected with our mental constitution. There is not one of the higher powers of our mind in respect of which we do not feel that we are tied and bound by the weight of our infirmities. Therefore we can have no difficulty in conceiving all our own powers exalted to an indefinite degree. And thus it is that although all Goodness, and Power and Knowledge must, in respect to quality, be conceived of as we know them in ourselves, it does not follow that they can only be conceived of according to the measure which we ourselves supply.

These considerations show—first, that as the human Mind is the highest created thing of which we have any knowledge, its conceptions of *what is* greatest in the highest degree must be

founded on what it knows to be the greatest and highest in i self, and, secondly, that we have no difficulty in understandin how this image of the Highest may, and must be, faint—withou being at all unreal or untrue.

There are, moreover, as we have seen, some remarkable feat ures connected with our consciousness of limitation pointing t the conclusion that we have faculties enabling us to recogniz certain truths when they are presented to us, which we coulc never have discovered for ourselves. The sense of mystery which is sometimes so oppressive to us, and which is nevei more oppressive than when we try to fathom and understand some of the commonest questions affecting our own life and nature, suggests and confirms this representation of the facts. For this sense of oppression can only arise from some Organs of mental vision watching for a light which they have been formed to see, but from which our own investigations cannot lift the veil. If that veil is to be lifted at all, the evidence is that it must be lifted for us. Physical science does not even tend to solve any one of the ultimate questions which it concerns us most to know, and which it interests us most to ask. It is according to the analogy and course of Nature that to these questions there should be some answering voice, and that it should tell us things such as we are able in some measure to understand. Nor ought it to be a thing incredible to us—or even difficult to believe—that the system disclosed should be in a sense anthropopsychic—that is to say, that it should bear some very near relation to our own forms of thought—to our own faculties of Mind, and Soul, and Spirit. For all we do know, and all the processes of thought by which knowledge is acquired, involve and imply the truth that our mind is indeed made in some real sense in the imageof the Creator, although intellectually its powers are very limited, and morally its condition is very low.

In this last element of consciousness, however—not the limitation of our intellectual powers, but the unworthiness of our moral character—we come upon a fact differing from any other which we have hitherto considered. It is not so easy to assign to it any consistent place in the Unities of Nature. What it is and what it appears to indicate, must form the subject of another chapter.

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CHAPTER IX.

ON THE MORAL CHARACTER OF MAN.

THE Consciousness of Unworthiness in respect to moral character is a fact as fundamental and as universal in the human mind as the Consciousness of Limitation in respect to intellectual power. Both of them may exist in a form so rudimentary as to be hardly recognizable. The limits of our Intelligence may be felt only in a dim sense of unsatisfied curiosity. The faultiness of our character may be recognized only in the vaguest emotions of occasional self-reproach. But as the knowledge of Mankind extends, and as the cultivation of their moral faculties improves, both these great elements of consciousness become more and more prominent, and occupy a larger and larger place in the horizon of their thoughts. It is always the men who know most who feel most how limited their knowledge is. And so likewise it is always the loftiest spirits who are most conscious of the infirmities which beset them.

But although these two great facts in human consciousness are parallel facts, there is a profound difference between them; and to the nature and bearing of this difference very careful attention must be paid.

We have seen in regard to all living things what the relation is between the physical powers which they possess and the ability which they have to use them. It is a relation of close and perfect correspondence. Everything requisite to be done for the unfolding and upholding of their life they have impulses universally disposing them to do, and faculties fully enabling them to accomplish. We have seen that in the case of some animals this correspondence is already perfect from the infancy of the creature, and that even in the case of those which are born comparatively helpless, there is always given to them just so much of impulse and of power as is requisite for the attain-

ment of their own maturity. It may be nothing more tha
mere impulse and power of opening the mouth for food,
the case of the chicks of many Birds; or it may be the
more active impulse and the much more complicated pow
which the young Mammalia seek and secure their nourishm
or it may be such wonderful special instincts as that by w
the newly hatched Cuckoo, although blind and otherwise
less, is yet enabled to expel its rivals from the nest, and
secure that undivided supply of food without which it c
not survive. But whatever the impulse or the power ma
it is always just enough for the work which is to be done.
have seen, too, that the amount of prevision which is invo
in those instinctive dispositions and actions of animals is c
greatest in those which are low in the scale of life, so tha
results for which they work, and which they do actually at
must be completely out of sight to them. In the wond
metamorphoses of Insect Life, the imperfect creature is gu
with certainty to the choice and enjoyment of the condit
which are necessary to its own development; and when
time comes it selects the position, and constructs a cel
which its own mysterious transformations are accomplished

All this is in conformity with an absolute and universal
in virtue of which there is established a perfect unity betw
these three things:—first, the physical powers and structur
all living creatures; secondly, those dispositions and instinc
appetites which are seated in that structure to impel and g
its powers; and thirdly, the external conditions in which
creature's life is passed, and in which its faculties find an
propriate field of exercise.

If Man has any place in the Unity of Nature, this law
prevail with him. There must be the same correspondence
tween his powers and the instincts which incite and direct
in their use. Accordingly it is in this law that we find the
planation and the meaning of his Sense of Ignorance.
without a sense of ignorance there could be no desire of kn
edge, and without his desire of knowledge Man would no
Man. His whole place in Nature depends upon it. His
osity, and his wonder, and his admiration, and his awe—t
are all but the adjuncts and subsidiary allies of that supr

affection which incites him to inquire and know. Nor is this desire capable of being resolved into his tendency to seek for an increased command over the comforts and conveniences of life. It is wholly independent of that kind of value which consists in the physical utility of things. The application of knowledge comes after the acquisition of it, and is not the only, or even the most powerful, inducement to its pursuit. The real incitement is an innate appetite of the Mind—conscious in various degrees of the mystery, and of the beauty, and of the majesty of the System in which it lives and moves; conscious, too, that its own relations to that System are but dimly seen and very imperfectly understood. In a former chapter we have seen that this appetite of knowledge is never satisfied, even by the highest and most successful exertion of those faculties which are, nevertheless, our only instruments of research. We have seen, too, what is the meaning and significance of that great Reserve of Power which must exist within us, seeing that it remains unexhausted and inexhaustible by the proudest successes of discovery. In this sense it is literally true that the eye is not satisfied with seeing, nor the ear filled with hearing. Every new advance has its new horizon. Every answered question brings into view another question unanswered, and perhaps unanswerable, lying close behind it. And so we come to see that this Sense of Ignorance is not only part of our nature, but one of its highest parts—necessary to its development, and indicative of those unknown and indefinite prospects of attainment which are at once the glory and the burden of Humanity.

It is impossible to mistake, then, the place which is occupied among the Unities of Nature by that Sense of Ignorance which is universal among men. It belongs to the number of those primary mental conditions which impel all living things to do that which it is their special work to do, and in the doing of which the highest law of their Being is fulfilled. In the case of the lower animals, this law, as to the part they have to play and the ends they have to serve in the economy of the world, is simple, definite, and always perfectly attained. No advance is with them possible, no capacity of improvement, no dormant or undeveloped powers leading up to wider and wider spheres of action. With Man, on the contrary, the law of his Being is a

law which demands progress, which endows him with faculties enabling him to make it, and fills him with aspirations which cause him to desire it. Among the lowest Savages there is some curiosity and some sense of wonder, else even the rude inventions they have achieved would never have been made, and their degraded superstitions would not have kept their hold. Man's Sense of Ignorance is one of the greatest of his gifts, for it is the secret of his wish to know. The whole structure and the whole furniture of his Mind is adapted to this condition. The highest law of his Being is to advance in wisdom and knowledge: and his sense of the Presence and of the Power of things which he can only partially understand, is an abiding witness of this law, and an abiding incentive to its fulfilment.

In all these aspects there is an absolute contrast between our Sense of Limitation in respect to intellectual power (or knowledge) and our Sense of Unworthiness in respect to moral character. It is not of ignorance, but of knowledge, that we are conscious here,—even the knowledge of the distinction between Good and Evil, and of that special Sense which in our nature is associated with it, namely, the Sense of moral Obligation. Now it is a universal fact of consciousness as regards ourselves, and of observation in regard to others, that, knowing evil to be evil, men are nevertheless prone to do it, and that, having this sense of moral Obligation, they are nevertheless prone to disobey it. This fact is entirely independent of the particular standard by which men in different stages of society have judged certain things to be good and other things to be evil. It is entirely independent of the infinite variety of rules according to which they recognize the doing of particular acts, and the abstention from other acts, to be obligatory upon them. Under every variety of circumstance in regard to these rules, under every diversity of Custom, of Law, or of Religion by which they are established, the general fact remains the same—that what men themselves recognize as duty they continually disobey, and what according to their own standard they acknowledge to be wrong they continually do.

There is unquestionably much difficulty in finding any place for this fact among the Unities of Nature. It falls therefore in

the way of this inquiry to investigate how this difficulty arises, and wherein it consists.

And here we at once encounter those old fundamental questions on the nature, the origin, and the authority of the Moral Sense which have exercised the human mind for more than two thousand years; and on which an eminent writer of our own time has said that no sensible progress has been made. This result may well suggest that the direction which inquiry has taken is a direction in which progress is impossible. If men will try to analyze something which is incapable of analysis, a perpetual consciousness of abortive effort will be their only and their inevitable reward.

For just as in the physical world there are bodies or substances which are (to us) elementary, so in the spiritual world there are perceptions, feelings, or emotions, which are equally elementary—that is to say, which resist all attempts to resolve them into a combination of other and simpler affections of the mind. And of this kind is the idea, or the conception, or the sentiment of Obligation. That which we mean when we say, "I ought," is a meaning which is incapable of reduction. It is a meaning which enters as an element into many other conceptions, and into the import of many other forms of expression, but it is itself uncompounded. All attempts to explain it do one or other of these two things—either they assume and include the idea of Obligation in the very circumlocutions by which they profess to explain its origin; or else they build up a structure which, when completed, remains as destitute of the idea of Obligation as the separate materials of which it is composed. In the one case, they first put in the gold, and then they think that by some alchemy they have made it; in the other case, they do not indeed first put in the gold, but neither in the end do they ever get it. No combination of other things will give the idea of Obligation, unless with and among these things there is some concealed or unconscious admission of itself. But in this, as in other cases with which we have already dealt, the ambiguities of language afford an easy means or an abundant source of self-deception. One common phrase is enough to serve the purpose—the "Association of Ideas." Under this vague and indefinite form of words all mental oper-

ations and all mental affections may be classed. Consequently those which are elementary may be included, without being expressly named. This is one way of putting in the gold and then of pretending to find it as a result. Take one of the simplest cases in which the idea of Obligation arises, even in the rudest minds—namely, the case of gratitude to those who have done us good. Beyond all question, this simple form of the Sense of Obligation is one which involves the association of many ideas. It involves the idea of Self as a moral agent and the recipient of good. It involves the idea of other human beings, as likewise moral agents, and as related to us by a common nature, as well as, perhaps, by still more special ties. It involves the idea of things good for them, and of our having power to confer these things upon them. All these ideas are "associated" in the sense of gratitude towards those who have conferred upon us any kind of favor. But the mere word "association" throws no light whatever upon the nature of the connection. "Association" means nothing but grouping or contiguity of any kind. It may be the grouping of mere accident—the associations of things which happen to lie together, but which have no other likeness, relation, or connection. But this, obviously, is not the kind of association which connects together the different ideas which are involved in the conception of gratitude to those who have done us good. What then is the associating tie? What is the link which binds them together, and constitutes the particular kind or principle of association? It is the Sense of Obligation. The associating or grouping power lies in this Sense. It is the centre round which the other perceptions aggregate. It is the seat of that force which holds them together, which keeps them in a definite and fixed relation, and gives its mental character to the combination as a whole.

If we examine closely the language of those who have attempted to analyze the Moral Sense, or, in other words, the Sense of Obligation, we shall always detect the same fallacy—namely, the use of words so vague that under cover of them the idea of Obligation is assumed as the explanation of itself. Sometimes this fallacy is so transparent in the very forms of expression which are used, that we wonder how men of even or-

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dinary intelligence, far more men of the highest intellectual power, can have failed to see and feel the confusion of their thoughts. Thus, for example, we find Mr. Grote expressing himself as follows:—"This idea of the judgment of others upon our conduct and feeling as agents, or the idea of our own judgment as spectators in concurrence with others upon our own conduct as agents, is the main basis of what is properly called Ethical sentiment." * In this passage the word "judgment" can only mean moral judgment, which is an exercise of the Moral Sense; and this exercise is gravely represented as the "basis" of itself.

Two things, however, ought to be carefully considered and remembered in respect to this elementary character of the Moral Sense. The first is, that we must clearly define to ourselves what the idea is of which, and of which alone, we can affirm that it is elementary; and secondly, that we must define to ourselves as clearly, if it be possible to do so, in what sense it is that any Faculty whatever of the Mind can really be contemplated as separable from, or as uncombined with, others.

As regards the first of these two things to be defined, namely, the idea which we affirm to be simple or elementary, it must be clearly understood that this elementary character, this incapability of being reduced by analysis, belongs to the bare sense or feeling of Obligation, and not at all, or not generally, to the processes of thought by which that feeling may be guided in its exercise. This distinction is immense and obvious. The Sense of right and of wrong is one thing; the way in which we come to attach the idea of right or wrong to the doing of certain acts, or to the abstention from certain other acts, is another and a very different thing. This is a distinction which applies equally to many other simple or elementary affections of the Mind. The liking or disliking of certain tastes or affections of the palate is universal and elementary. But the particular tastes which are the objects of liking or of aversion are for the most part determined by habits and education. There may be tastes which all men are so constituted as necessarily to feel disgusting; and in like manner there may be certain acts which all men everywhere must feel to be con-

* "Fragments on Ethical Subjects," pp. 9, 10.

trary to their Sense of Obligation. Indeed we shall see good reason to believe that this not only may be so, but must be so. But this is a separate subject of inquiry. The distinction in principle is manifest between the Sense itself and the laws by which its particular applications are determined.

The second of the two things to be defined—namely, the sense in which any Faculty whatever of the Mind can really be regarded singly, or as uncombined with others—is a matter so important that we must stop to consider it with greater care.

The analogy is not complete, but only partial, between the analysis of Mind and the analysis of Matter. In the analysis of Matter we reach elements which can be wholly separated from each other, so that each of them can exist and can be handled by itself. In the analysis of Mind we are dealing with one Organic Whole; and the operation by which we break it up into separate faculties or powers is an operation purely ideal, since there is not one of these faculties which can exist alone, or which can exert its special functions without the help of others. When we speak, therefore, of a Moral Sense or of Conscience, we do not speak of it as a separate entity any more than when we speak of Reason or of Imagination. Strictly speaking, no Faculty of the Mind is elementary in the same sense in which the elements of Matter are (supposed to be) absolutely simple or uncombined. Perhaps there is no Faculty of the Mind which presents itself so distinctly and is so easily separable from others as the Faculty of Memory. And yet Memory cannot always reproduce its treasures without an effort of the Will, nor, sometimes, without many artificial expedients of Reason to help it in retracing the old familiar lines. Neither is there any Faculty more absolutely necessary than Memory to the working of every other. Without Memory there could not be any Reason, nor any Reflection, nor any Conscience. In this respect all the higher Faculties of the human Mind are much more inseparably blended and united in their operation than those lower Faculties which are connected with bodily sensation. These lower Faculties are indeed also parts of one Whole, are connected with a common centre, and can all be paralyzed when that centre is affected. But in their ordinary activities their spheres of action seem widely differ-

ent, and each of them can be, and often is, seen in apparently solitary and independent action. Sight and taste and touch and hearing are all very different from each other—so separate indeed that the language of the one can hardly be translated into the language of the other.

But when from these lower Faculties, which are connected with separate and visible Organs of the Body, and which we possess in common with the Brutes, we ascend to the great central group of higher and more spiritual Faculties which are peculiar to Man, we soon find that their unity is more absolute, and their interdependence more visibly complete. Ideally we can distinguish them, and we can range them in an ascending order. We can separate between different elements and different processes of thought, and in accordance with these distinctions we can assign to each of them a separate Faculty of the Mind. We think of these separate Faculties as being each specially apprehensive of one kind of idea, or specially conducting one kind of operation. Thus the reasoning Faculty works out the process of logical sequence, and apprehends one truth as the necessary consequence of another. Thus the Faculty of Reflection passes in review the previous apprehensions of the Intellect, or the fleeting suggestions of Memory and of Desire, looks at them in different aspects, and submits them now to the tests of reasoning, and now to the appreciations of the Moral Sense. Thus, again, the supreme Faculty of Will determines the subject of investigation, or the direction of thought, or the course of conduct. But although all these Faculties may be, and indeed must sometimes be, conceived and regarded as separate, they all more or less involve each other; and in the great hierarchy of powers, the highest and noblest seem always to be built upon the foundations of those which stand below. Memory is the indispensable servant of them all. Reflection is ever turning the Mind inward on itself. The logical Faculty is ever rushing to its own conclusions as necessary consequences of the elementary axioms from which it starts, and which are to it the objects of direct and intuitive apprehension. The Moral Sense is ever passing its judgments upon the conduct of others and of ourselves; whilst the Will is ever present to set each and all to their proper work. And the

proper work of every Faculty is to see some special kind of relation or some special quality in things which other Faculties have not been formed to see. But although these qualities in things are in themselves separate and distinct, it does not at all follow that the separate Organs of the Mind, by which they are severally apprehended, can ever work without each other's help. The sense of logical necessity is clearly different from the sense of moral Obligation. But yet as Reason cannot work without the help of Memory, so neither can the Moral Sense work without the help of Reason. And the elements which Reason has to work on in presenting different actions to the judgment of the Moral Sense, may be, and often are, of very great variety. It is these elements, many and various in their character, and contributed through the help and concurrence of many different Faculties of the Mind, that men are really distinguishing and dissecting when they think they are analyzing the Moral Sense itself. What they do analyze with more or less success is not the Moral Sense, but the conditions under which that Sense comes to attach its special judgments of approval or of condemnation to particular acts or to particular motives.

And this analysis of the conditions under which the Moral Sense performs its work, although it is not the kind of analysis which it often pretends to be, is nevertheless in the highest degree important, for although the Sense of Obligation, or, as it is usually called, the Moral Sense, may be in itself simple, elementary, and incapable of reduction, it is quite possible to reach conclusions of the most vital interest concerning its nature and its functions by examining the circumstances which do actually determine its exercise, especially those circumstances which are necessary and universal facts in the experience of Mankind.

There is, in the first place, one question respecting the Moral Sense which meets us at the threshold of every inquiry respecting it, and to which a clear and definite answer can be given. This question is—What is the subject-matter of the Moral Sense? or, in other words, what is the kind of thing of which alone it takes any cognizance, and in which alone it recognizes the qualities of right and wrong?

To this fundamental question one answer, and one answer

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only, can be given. The things, and the only things, of which the Moral Sense takes cognizance are the actions of Man. It can take no cognizance of the actions of machines, nor of the actions of the inanimate Forces of Nature, nor of the actions of Beasts, except in so far as a few of these may be supposed to possess in a low and elementary degree some of the characteristic powers of Man. Human conduct is the only subject-matter in respect of which the perceptions of the Moral Sense arise. They are perceptions of the Mind which have no relation to anything whatever except to the activities of another Mind constituted like itself. For, as no moral judgment can be formed, and no moral perception can be felt, except by a moral agent, so neither can it be formed in respect to the conduct of any other agent which has not, or is not assumed to have, a nature like our own—moral, rational, and free.

And this last condition—freedom—which is an essential one to the very idea of an Agency having any moral character, will carry us a long way on towards a farther definition of the subject-matter on which the Moral Sense is exercised. It is, as we have seen, human conduct. But it is not human conduct in its mere outward manifestations, for the only moral element in human conduct is its actuating motive. If any human action is determined not by any motive whatever, but simply by external or physical compulsion, then no moral element is present at all, and no perception of the Moral Sense can arise respecting it. Freedom, therefore, in the sense of exemption from such compulsion, must be assumed as a condition of human action absolutely essential to its possessing any moral character whatever. There can be no moral character in any action, so far as the individual actor is concerned, apart from the meaning and intention of the actor. The very same deed may be good, or, on the contrary, devilishly bad, according to the inspiring motive of him who does it. The giving of a cup of cold water to assuage suffering, and the giving it to prolong life in order that greater suffering may be endured, are the same outward deeds, but are exactly opposite in moral character. In like manner, the killing of a man in battle, and the killing of a man for robbery or revenge, are the same actions, but the one may

be often right, whilst the other must be always wrong, because of the different motives which incite the deed.

Illustrations of the same general truth might be given as infinite in variety as the varying circumstances and conditions of human conduct. It is a truth perfectly consistent with the doctrine of an Independent Morality. Every action of a voluntary agent has, and must have, its own moral character, and yet this character may be separate and apart from its relation to the responsibility of the individual man who does it. That is to say, every act must be either permitted, or forbidden, or enjoined, by legitimate Authority, although the man who does it may be ignorant of the Authority or of its commands. And the same proposition holds good if we look upon the ultimate standard of morality from the Utilitarian point of view. Every act must have its own relation to the future. Every act must be either innocent, or beneficent, or hurtful in its ultimate tendencies and results. Or, if we like to put it in another form, every act must be according to the harmony of Nature or at variance with that harmony, and therefore an element of disorder and disturbance. In all these senses, therefore, we speak, and we are right in speaking, of actions as in themselves good or bad, because we so speak of them according to our own knowledge of the relation in which they stand to those great axioms of morality, which are facts and not mere assumptions or even mere beliefs. But we are quite able to separate this judgment of the act from the judgment which can justly be applied to the individual agent. As regards him, the act is right or wrong, not according to our knowledge, but according to his own. And this great distinction is universally recognized in the language and (however unconsciously) in the thoughts of men. It is sanctioned, moreover, by Supreme Authority. The most solemn prayer ever uttered upon Earth was a prayer for the forgiveness of an act of the most enormous wickedness, and the ground of the petition was specially declared to be that those who committed it "knew not what they did." The same principle which avails to diminish blame, avails also to diminish or to extinguish merit. We may justly say of many actions that they are good in themselves, assuming, as we naturally do, that those who do such actions do them under the influence

of the appropriate motive. But if this assumption fails in any particular case, we cannot and we do not credit the actor with the goodness of his deed. If he has done a thing which in itself is good in order to compass an evil end, then, so far as he is concerned, the deed is not good, but bad. It may indeed be worse in moral character than many other kinds of evil deeds, and this just because of the goodness usually attaching to it. For this goodness may very probably involve the double guilt of some special treachery, or some special hypocrisy; and both treachery and hypocrisy are in the highest degree immoral. It is clear that no action, however apparently benevolent, if done from some selfish or cruel motive, can be a good or a moral action.

It may seem, however, as if the converse of this proposition cannot be laid down as broadly and as decidedly. There are deeds of cruelty in abundance which have been done, ostensibly at least, and sometimes, perhaps, really, from motives comparatively good, and yet from which an enlightened Moral Sense can never detach the character of wickedness and wrong. These may seem to be cases in which the motive does not determine the moral character of the action, and in which our Moral Sense persists in condemning the thing done in spite of the motive. But if we examine closely the grounds on which we pass judgment in such cases, we shall not, I think, find them exceptions to the rule or law that the purpose or intention of a free and voluntary agent is the only thing in which any moral goodness can exist, or to which any moral judgment can be applied. In the first place, we may justly think that the actors in such deeds are to a large extent themselves responsible for the failure in knowledge, and for the defective Moral Sense which blind them to the evil of their conduct, and which lead them to a wrong application of some motive which may in itself be good. And in the second place, we may have a just misgiving as to the singleness and purity of the alleged purpose which is good. We know that the motives of men are so various and so mixed, that they are not always themselves conscious of that motive which really prevails, and we may have often good reasons for our convictions that bad motives unavowed have really determined conduct for which good motives only have

been alleged. Thus, in the case of religious persecution, we may be sure that the lust of power, and the passion of resentment against those who resist its ungovernable desires, have very often been the impelling motive, where nothing but the love of truth has been acknowledged. And this at least may be said, that in the universal judgment of Mankind, actions which they regard as wrong have not the whole of that wrongfulness charged against the doers of them, in proportion as we really believe the agents to have been guided purely and honestly by their own sense of Moral Obligation.

On the whole, then, we can determine or define with great clearness and precision the field within which the Moral Sense can alone find the possibilities of exercise,—and that field is the conduct of men;—by which is meant not their actions only, but the purpose, motive, or intention by which the doing of these actions is determined. This conclusion, resting on the firm ground of observation and experience, is truthfully expressed in the well-known lines of Burns:—

> "The heart's aye the part aye
> Which makes us right or wrang."

And now it is possible to approach more closely to the great central question of all ethical inquiry:—Are there any motives which all men under all circumstances recognize as good? Are there any other motives which, on the contrary, all men under all circumstances recognize as evil? Are there any fundamental perceptions of the Moral Sense upon which the standard of right and wrong is planted at the first, and round which it gathers to itself, by the help of every Faculty through which the Mind can work, higher and higher conceptions of the course of duty?

In dealing with this question, it is a comfort to remember that we are in possession of analogies deeply seated in the constitution and in the course of Nature. It is quite possible to assign to Intuition or to Instinct the place and rank which really belongs to it, and to assign also to what is called Experience the functions which are unquestionably its own. There is no Sense or Faculty of the Mind which does not gain by education—not one which is independent of those processes of

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development which result from its contact with the external world. But neither is there any Sense or Faculty of the Mind which starts unfurnished with some one or more of those intuitive perceptions with which all education and all development must begin. Just as every exercise of Reason must be founded on certain axioms which are self-evident to the logical Faculty, so all other exercises of the Mind must start from the direct perception of some rudimentary truths. It would be strange indeed if the moral Faculty were any exception to this fundamental law. This Faculty in its higher conditions, such as we see it in the best men in the most highly civilized communities, may stand at an incalculable distance from its earliest and simplest condition, and still more from its lowest condition, such as we see it in the most degraded races of Mankind. But this distance has been reached from some starting-point, and at that starting-point there must have been some simple acts or dispositions to which the sense of Obligation was instinctively attached. And beyond all question this is the fact. All men do instinctively know what gives pleasure to themselves, and therefore also what gives pleasure to other men. Moreover, to a very large extent, the things which give them pleasure are the real needs of life, and the acquisition or enjoyment of these is not only useful but essential to the well-being or even to the very existence of the race. And as Man is a social animal by nature, with social instincts at least as innate as those of the Ant or the Beaver or the Bee, we may be sure that there were and are born with him all those intuitive perceptions and desires which are necessary to the growth and unfolding of his powers.

And this we know to be the fact, not only as a doctrine founded on the unities of Nature, but as a matter of universal observation and experience. We know that without the Moral Sense Man could not fulfil the part which belongs to him in the world. It is as necessary in the earliest stages of the Family and of the Tribe, as it is in the latest developments of the State and of the Church. It is an element without which nothing can be done—without which no man could trust another, and, indeed, no man could trust himself. There is no bond of union among men—even the lowest and the worst—which does not

involve and depend upon the Sense of Obligation. There is no kind of brotherhood or association for any purpose which could stand without it. As a matter of fact, therefore, and not at all as a matter of speculation, we know that the Moral Sense holds a high place as one of the necessary conditions in the development of Man's nature, in the improvement of his condition, and in the attainment of that place which may yet lie before him in the future of the world.

There are other sentiments and desires which, being as needful, are equally instinctive. Thus, the desire of communicating pleasure to others is one of the instincts which is as universal in Man as the desire of communicating knowledge. Both are indeed branches of the same stem—offshoots from the same root. The acquisition of knowledge, to which we are stimulated by the instinctive affections of curiosity and of wonder, is one of the greatest of human pleasures, and the desire we have to communicate our knowledge to others is the great motive-force on which its progress and accumulation depend. The pleasure which all men take, when their dispositions are good, in sharing with others their own enjoyments, is another feature quite as marked and quite as innate in the character of Man. And if there is any course of action to which we do instinctively attach the sentiment of moral approbation, it is that course of action which assumes that our own desires, and our own estimates of good, are the standard by which we ought to judge of what is due to, and is desired by others. The social instincts of our nature must, therefore, naturally and intuitively indicate benevolence as a virtuous, and malevolence as a vicious disposition; and, again, our knowledge of what is benevolent and of what is malevolent is involved in our own instinctive sense of what to us is good, and of what to us is evil. It is quite true that this sense may be comparatively low or high, and consequently that the standard of obligation which is founded upon it may be elementary and nothing more. Those whose own desires are few and rude, and those whose estimates of good are very limited, must of course form an estimate correspondingly poor and scant of what is good for, and of what is desired by, others. But this exactly corresponds with the facts of human nature. This is precisely the variety in unity which its phenomena pre-

sent. There are no men of sane mind in whom the Moral Sense does not exist; that is to say, there are no men who do not attach to some actions or other the sentiment of approval, and to some other actions the opposite sentiment of condemnation. On the other hand, the selection of the particular actions to which these different sentiments are severally attached is a selection immensely various; there being, however, this one common element in all,—that the course of action to which men do by instinct attach the feeling of moral Obligation, is that course of action which is animated by the feeling that their own desires and their own estimate of good is the standard by which they must judge of what is due by them to others, and by others to themselves.

And here we stand at the common point of departure from which diverge the two great antagonistic schools of Ethical Philosophy. On the one hand, in the intuitive and elementary character which we have assigned to the sentiment of Obligation, considered in itself, we have the fundamental position of that school which asserts an independent basis of morality; whilst, on the other hand, in the elementary truths which we have assigned to the Moral Sense as its self-evident apprehensions, we have a rule which corresponds, in one aspect at least, to the fundamental conception of the Utilitarian school. For the rule which connects the idea of Obligation with conduct tending to the good of others, as tested by our own estimate of what is good for ourselves, is a rule which clearly brings the basis of morality into very close connection with the practical results of conduct. Accordingly, one of the ablest modern advocates of the Utilitarian system has declared that "in the golden rule of Jesus of Nazareth we read the complete spirit of the ethics of Utility. To do as you would be done by, and to love your neighbor as yourself, constitute the ideal perfection of Utilitarian morals."*

This may well seem a strange and almost a paradoxical result to those who have been accustomed to consider the Utilitarian theory not so much a low standard of morals, as an idea which is devoid altogether of that element in which the very essence of morality consists. But it is a result due to these two causes

* J. S. Mill, "Utilitarianism," pp. 24, 25.

—first, that under the fire of controversy, Utilitarians been obliged to import into the meaning of their words that does not really belong to them; and secondly, to th that when this essential alteration has been made, th theory, or rather the portion of it which remains, does rep one very important aspect of a very complex truth.

It will be well to examine a little more closely the di ways in which these two causes operate.

In the first place, as regards the ambiguities of langu moment's consideration will convince us that the word "u has, in its proper and primary signification, nothing wh of the ethical meaning which is attached to it in the Utili theory of morals. In its elementary signification the us simply the serviceable. It is curious to observe that th word has no ethical savor about it. On the contrary, it i ciated rather with the lower than with the higher uses o duct. If this be objected to as preventing the two words being really the equivalent of each other, then at least le recognized that utility must be divested of its ethical as tions before it can be set up as an ethical test. If utility assumed to be the equivalent of goodness, it becomes of a mere play on words to represent usefulness as the cri of virtue. If we are to conduct our analysis correctly, we expel from utility every adventitious element of me The usefulness of a thing means nothing more than its c civeness to some purpose. But it may be any purpose,—m good, or morally bad, or morally indifferent. The boot the thumb-screw, and the rack are all useful machines f purpose of producing torture on the victim, and for the pu too, of giving to the torturers that pleasure or satisfaction wicked men find in tyranny or revenge. The words "g and "bad" are themselves often used in a secondary an rivative sense, which, like "useful," may be destitute o ethical meaning. A good thumb-screw would mean an i ment well adapted to produce the most exquisite pain. A torture may mean a torture well calculated to gratify the s sentiment of revenge. In like manner, although not to the extent, the words "right" and "wrong" are often used no ethical element of meaning. The right way for a ma

wishes to commit suicide would be the way to a precipice over which he desires to throw himself. But the same way is the wrong way for him, if he wishes to avoid the danger of falling. In this way we may speak of the right way of doing the most wicked things.

One most eminent expounder of the Utilitarian theory has taken advantage of this common use of the words "good" and "bad," and of "right" and "wrong," to represent utility and inutility to be the essential idea of all goodness and of all badness respectively.* Thus the unavoidable ambiguities of speech are employed to give a scientific aspect to the confounding and obliteration of the profoundest distinctions which exist in knowledge. By the double process of expelling from Goodness the idea of virtue, and of inserting into Utility the idea of beneficence, the fallacies of language become complete. Because subserviency to purpose of any kind is the meaning of "good," when applied equally to an instrument of torture and to an instrument for the relief of suffering, therefore, it is argued, the same meaning must be the essential one when we speak of a good man. And so indeed it may be, if we know or assume beforehand what the highest purpose is to which Man can be made subservient. There is a well-known Catechism of one of the Reformed Churches which opens with the question, "What is the chief end of Man?" The answer is perhaps one of the noblest in the whole compass of Theology. "Man's chief end is to glorify God and to enjoy Him forever." † Given certain further beliefs as to the character of the Divine Being, and the methods of His government, then indeed it would be true that this is a conception of the purpose of Man's existence which would erect mere serviceableness or utility into a perfect rule of conduct. Perhaps even a lower or less perfect conception of the great aim of Man's life would be almost enough. If virtue and beneficence are first assumed to be the highest purpose of his Being, then subserviency to that purpose may be all that is meant by goodness. But, without this assumption as to the "chief end of Man," there

* Herbert Spencer, "Data of Ethics," chap. iii.

† "The Shorter Catechism, presented by the Westminster Assembly of Divines to both Houses of Parliament, and by them approved."

would be no ethical meaning whatever in the phrase of "a good man." It might mean a good thief, or a good torturer, or a good murderer. Utility, that is to say, mere subserviency to any purpose, is undoubtedly a good in itself, and of this kind is the goodness of a machine which is invented for a bad or evil purpose. But this utility in the machine is, so far as the machine is concerned, destitute of any moral character whatever, and, so far as those who employ it are concerned, the utility is not virtuous, but, on the contrary, it is vicious. It is clear, therefore, that when the word "Utility" is used as meaning moral or even physical good, and still more when it is identified with virtue, or when it is declared to be the standard of that which is right or virtuous in conduct, the word is used not in its own proper sense, but in a special or adventitious sense, in which it is confined to one special kind of usefulness, namely, that which conduces to good ends, and good aims, and good purposes. That is to say, the sense in which utility is spoken of as the test or standard of virtue is a sense which assumes that goodness and virtue are independently known, or in other words, that they are determined and recognized by some other test and some other standard.

It is, however, clear that when by this other test and standard, whatever it may be, we have already felt or apprehended that it is right and virtuous to do good to others, then the usefulness of any action or of any course of conduct, in the production of such good, does become a real test and indication of that which we ought to do. It is a test or indication of the particular things which it is right to do, but not at all a test of the moral Obligation which lies upon us to do them. This Obligation must be assumed, and is assumed, in every argument on the moral Utility of things. It is by confounding these two very distinct ideas that the Utilitarian theory of the ultimate basis of moral Obligation has so long maintained a precarious existence, borrowing from the misuse of words a strength which is not its own. But the moment this distinction is clearly apprehended, then, although we set aside the bare idea of usefulness, apart from the good or bad purpose towards which that usefulness conduces, as affording any explanation whatever of the ultimate nature and source of duty, we may well nevertheless, be ready

to adopt all that the Utilitarian theory can show us of that inseparable unity which is established in the constitution of the world between the moral character, and the ultimate results, of conduct. As far as these results can be traced beforehand, and in proportion as they can be traced farther and farther in the light of expanding knowledge, they do indicate the path of duty. They do indicate the line of action which is obligatory on voluntary agents, to whom a very large amount of power is given in directing the course of things. Beyond all doubt there are a thousand acts and a thousand courses of conduct which are in accordance with the Moral Sense, because and only because of the known happiness of their effects. This is the fact, or rather the class of facts, which has in all ages recommended the Utilitarian theory of morals to so many powerful minds. For, indeed, if we understand by utility, not the low or limited idea of mere usefulness for any purpose—not even the mere idea of pleasure as an unquestionable good of its own kind, nor the mere idea of immediate profit or advantage—but the very different conception of the beneficence of ultimate results on the welfare of all men and of all creatures, then there may be, and probably there is, an universal and absolute coincidence between the things which it is wise, and the things which it is right, to do.

Men may imagine, and they have imagined, that under this conception of utility they can devise a system of morality which is of such transcendental excellence that it is far too good for Earth. Thus it has been laid down that Evolution, in its most perfect conception, would be such that the development of every creature would be compatible with the equal development of every other. In such a system it is said there would be no "struggle for existence—no harmful competition, no mutual devouring—no death." * The inspired imaginings of the Jewish Prophets of some future time when the Lion shall lie down with the Lamb, and the ideas which have clustered round the Christian Heaven, are more probably the real origin of this conception than any theory of Evolution founded on the facts and laws of Nature. But, for all practical purposes, such a system of Ethics is as useless as the dreams of Plato's Republic or

* Herbert Spencer, "Data of Ethics," chap. ii. pp. 18, 19.

of More's Utopia. If, however, we have got from some independent source a right idea of that which will be most beneficent in its ultimate results, we may well be guided by this light in so far as we can see it. But inasmuch as these far-off results and tendencies of conduct cannot always be within sight, and are indeed very often wholly beyond the horizon visible to us, this admission, or rather this high doctrine that the Right and the Useful are always coincident, is a widely different doctrine from that which identifies the sense of Obligation with the perception of Utility. The mere perception that any act or course of conduct will certainly be beneficent in its results, would be of no avail without the separate feeling that it is right to strive for results which are beneficent.

And here it is well worthy of observation, that in direct proportion to the height and sublimity of the meaning artificially attached to the word "utility," it becomes less and less available as a test or as a rule of conduct. So long as the simple and natural meaning was put upon utility, and the good was identified with the pleasurable, or the serviceable, the Utilitarian theory of morals did indicate at least some rule of life, however low that rule might be. But now that the apostles of that theory have been driven to put upon utility a transcendental meaning, and the pleasurable is interpreted to refer not merely to the immediate and visible effects of conduct on ourselves or others, but to its remotest effects upon all living Beings, both now and for all future time, the Utilitarian theory in this very process of sublimation becomes lifted out of the sphere of human judgment. If it be true "that there can be no correct idea of a part without a correct idea of the correlative whole," and if human conduct in its tendencies and effects is only "a part of universal conduct," *—that is to say, of the whole System of the Universe in its past, its present, and its future—then, as this whole is beyond all our means of knowledge and comprehension, it follows that utility, in this sense, can be no guide to us. If indeed this System of the Universe has over it, or in it, one Supreme Authority, and if we knew on that Authority the things which do make, not only for our own everlasting peace, but for the perfect accomplishment of the highest purposes of

* Herbert Spencer, "Data of Ethics," chap. i. pp. 1–6.

Creation to all living things, then indeed the Rule of Utility is resolved into the simple Rule of Obedience to legitimate Authority. And this logical result is consistent with all we know of the Unity of Nature, and with all that we can conceive of the central and ultimate Authority on which its Order rests. All intuitive perceptions come to us from that Authority. All instincts which are the result of Organization come to us from that Authority. All the data of Reason come to us from that Authority. All these in their own several spheres of operation may well guide us to what is right, and may well give us, too, the conviction that what is right is also what is best, "at last, far off, at last to all."

Thus far a clear and consistent answer can be given to one of the greatest questions of ethical inquiry, namely, the nature of the relation between those elements in conduct which make it useful, and those elements in conduct which make it virtuous. The usefulness of conduct in promoting ends and purposes which are good is, in proportion to the nature and extent of that good, a test and an index of its virtue. But the usefulness of conduct in promoting ends and purposes which are not good, is a mark and index, not of virtue, but of vice. It follows from this that utility in itself has no moral character whatever apart from the particular aim which it tends to accomplish, and that the moral goodness of that aim is presupposed when we speak or think of the utility of conduct as indicative of its virtue. But this character of goodness must be matter of independent and instinctive recognition, because it is the one distinction between the kind of usefulness which is virtuous and the many kinds of usefulness which are vicious. Accordingly we find in the last resort that our recognition of Goodness in the conduct of other men towards ourselves is inseparable from our own consciousness of the needs and wants of our own life, and of the tendency of that conduct to supply them. This estimate of Goodness seated in the very nature of our bodies and of our minds becomes necessarily, also, a standard of Obligation as regards our conduct to others; for the unity of our nature with that of our kind and fellows is a fact seen and felt intuitively in the sound of every voice and in the glance of every eye around us.

But this great elementary truth of morals, that we ought to

do to others as we know we should wish them to do to us, is not the only truth which is intuitively perceived by the Moral Sense. There is, at least, one other among the rudiments of duty which is quite as self-evident, quite as important, quite as far-reaching in its consequences, and quite as early recognized. Obedience to the Will of legitimate Authority is necessarily the first of all motives with which the sense of Obligation is inseparably associated; whilst its opposite, or rebellion against the commands of legitimate Authority, is the spirit and the motive upon which the Moral Sense pronounces its earliest sentence of disapproval and of condemnation. At first sight it may seem as if the legitimacy of any Authority is a previous question, itself requiring to be determined by the Moral Sense, seeing that it is not until this character of legitimacy or rightfulness has been recognized as belonging to some particular Authority, that obedience to its commands comes in consequence to be recognized as wrong. A moment's consideration, however, will remind us that there is at least one Authority the rightfulness of which is not a question but a fact. All men are born of Parents. All men, moreover, are born in a condition of utter helplessness and of absolute dependence. Moreover, this dependence is not a mere external dependence, such, for example, as the dependence of a slave upon a master. Still less is it like the dependence of us all on the inanimate materials of Nature. It is a dependence arising out of conditions full to overflowing of all the elements to which the sentiment of moral Obligation is necessarily and intuitively attached. It is the least and lowest of these elements that at the breasts of its Mother an infant first satisfies its hunger and its thirst. Other elements follow in an ascending order. In the arms of its Mother it feels the first sense of rest, and the first ideas of refuge and of protection. In the voice of its Mother it hears the first expressions of love, and makes the first responses which that love demands. In the smile of its Mother it first finds the great gift of laughter. In the eyes of its Mother it has its first look into the mirror of another spirit, and feels the answering tides which are stirring within its own. These are but a part of the great claim accumulating with the hours and days, upon which the authority of a Mother rests. And so it comes to pass that the rightful-

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ness of that Authority is by the necessities of Nature recognized from the first, and when its voice is issued in command, the duty of obedience is felt and known. As a matter of fact, therefore, and not at all as a matter of question or of doubt, our first conception of duty, or of moral Obligation, is necessarily and universally attached to such acts as are in conformity with the injunctions of this first and most indisputable of all Authorities.

Standing, then, on this firm ground of universal and necessary experience, we are able to affirm with absolute conviction, that our earliest conceptions of duty—our earliest exercises of the Moral Sense—are not determined by any considerations of utility, or by any conclusions of the judgment on the results or on the tendencies of conduct.

But the same reasoning, founded on the same principle of simply investigating and ascertaining facts, will carry us a great way farther on. As we grow up from infancy, we find that our Parents are themselves also subject to Authority, owing and owning the duty of obedience to other persons or to other powers. This higher Authority may be nothing but the rules and customs of a rude Tribe; or it may be the Will of an absolute Sovereign; or it may be the accumulated and accepted Traditions of a Race; or it may be the Laws of a great civilized Community; or it may be the Authority, still higher, of that Power which is known or believed to be supreme in Nature. But in all and in each of these cases, the sense of Obligation is inseparably attached to obedience to some Authority, the legitimacy or rightfulness of which is not itself a question but a fact.

It is true, indeed, that these rightful Authorities, which are enthroned in Nature, are fortified by power to enforce their commands, and to punish violations of the duty of obedience. It is true, therefore, that from the first moments of our existence the sense of Obligation is re-enforced by the fear of punishment. And yet we know, both as a matter of internal consciousness, and as a matter of familiar observation in others, that this Sense of Obligation is not only separable from the fear of punishment, but is even sharply contra-distinguished from it. Not only is the Sense of Obligation powerful in cases where the fear of punishment is impossible, but in direct proportion as the fear of pun-

ishment mixes or prevails, the moral character of an act otherwise good is diminished or destroyed. The fear of punishment and the hope of reward are, indeed, auxiliary forces which cannot be dispensed with in society. But we feel that complete goodness and perfect virtue would dispense with them altogether; or rather, perhaps, it would be more correct to say, that the hope of reward would be merged and lost as a separate motive in that highest condition of mind in which the performance of duty becomes its own reward, because of the satisfaction it gives to the Moral Sense, and because of the love borne to that Authority whom we feel it our duty to obey.

The place occupied by this instinctive sentiment in the equipment of our nature is as obvious as it is important. The helplessness of infancy and of childhood is not greater than would be the helplessness of the race if the disposition to accept and to obey Authority were wanting in us. It is implanted in our nature only because it is one of the first necessities of our life, and a fundamental condition of the development of our powers. All Nature breathes the spirit of Authority, and is full of the exercise of command. "Thou shalt," or "Thou shalt not," are words continually on her lips, and all her injunctions and all her prohibitions are backed by the most tremendous sanctions. Moreover, the most tremendous of these sanctions are often those which are not audibly proclaimed, but those which come upon us most gradually, most imperceptibly, and after the longest lapse of time. Some of the most terrible diseases which afflict humanity are known to be the results of vice, and what has long been known of some of these diseases is more and more reasonably suspected of many others. The truth is, that we are born into a System of things in which every act carries with it, by indissoluble ties, a long train of consequences reaching to the most distant future, and which for the whole course of time affect our own condition, the condition of other men, and even the conditions of external Nature. And yet we cannot see those consequences beyond the shortest way, and very often those which lie nearest are in the highest degree deceptive as an index to ultimate results. Neither pain nor pleasure can be accepted as a guide. With the lower animals, indeed, these, for the most part, tell the truth, the whole truth,

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and nothing but the truth. Appetite is all that the creature has, and in the gratification of it the highest law of the animal Being is fulfilled. In Man, too, appetite has its own indispensable function to discharge. But it is a lower function, and amounts to nothing more than that of furnishing to Reason a few of the primary data on which it has to work—a few, and a few only. Physical pain is indeed one of the threatenings of natural Authority; and physical pleasure is one of its rewards. But neither the one nor the other forms more than a mere fraction of that awful and Imperial Code under which we live. It is the Code of an everlasting Kingdom, and of a jurisprudence which endures throughout all generations. It is a Code which continually imposes on Man the abandonment of pleasure, and the endurance of pain, whenever and wherever the higher purposes of its law demand of him the sacrifice. Nor has this spirit of Authority ever been without its witness in the human Spirit, or its response in the human Will. On the contrary, in all ages of the world, dark and distorted as have been his understandings of Authority, Man has been prone to acknowledge it, and to admit it as the basis of Obligation and the rule of duty. This, at all events, is one side of his character, and it is universally recognized as the best.

There is no difficulty, then, in seeing the place which this Instinct holds in the Unity of Nature. It belongs to that class of gifts, universal in the world, which enable all living things to fulfil their part in the Order of Nature, and to discharge the functions which belong to it. It is when we pass from a review of those instincts and powers with which Man has been endowed, to a review of their actual working and results, that we for the first time encounter facts which are wholly exceptional, and which it is, accordingly, most difficult to reconcile with the unities of Nature. This difficulty does not lie in the mere existence of a Being with powers which require for their perfection a long process of development. There is no singularity in this. On the contrary, it is according to the usual course and the universal analogy of Nature. Development in different forms, through a great variety of stages, and at different rates of progress, is the most familiar of all facts in Creation. In the case of some of the lower animals, and especially

in the case of many among the lowest, the process of development is carried to an extent which may almost be said to make the work of Creation visible. There are numberless creatures which pass through separate stages of existence having no likeness whatever to each other. In passing through these stages, the same Organism differs from itself in form, in structure, in the food on which it subsists, and even in the very element in which it breathes and lives. Physiologists tell us that changes having a mysterious and obscure analogy with these, pass over the embryo of all higher animals before their birth. But after birth the development of every individual among the higher orders of creation is limited to those changes which belong to growth, to maturity, and decay. Man shares in these changes, but in addition to these he undergoes a development which affects him not merely as an individual, but as a species and a race. This is purely a development of mind, of character, and of knowledge, giving, by accumulation from generation to generation, increased command over the resources of Nature, and a higher understanding of the enjoyments and of the aims of life.

It is true, indeed, that this is a kind of development which is itself exceptional—that is to say, it is a kind of development of which none of the lower animals are susceptible, and which therefore separates widely between them and Man. But although it is exceptional with reference to the lower orders of Creation, it is very important to observe that it constitutes no anomaly when it is regarded in connection with Creation as a whole. On the contrary, it is the natural and necessary result of the gift of Reason and of all those mental powers which are its servants or allies. But all Nature is full of these—so full, that every little bit and fragment of its vast domain overflows with matter of inexhaustible interest to that one only Being who has the impulse of inquiry and the desire to know. This power or capacity in every department of Nature of fixing the attention and of engrossing the interest of Man, depends on the close correspondence between his own Faculties and those which are reflected in Creation, and on his power of recognizing that correspondence as the highest result of investigation. The lower animals do reasonable things without the gift of Rea-

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son, and things, as we have seen, often involving a very distant foresight, without having themselves any knowledge of the future. They work for that which is to be, without seeing or feeling anything beyond that which is. They enjoy, but they cannot understand. Reason is, as it were, brooding over them and working through them, whilst at the same time it is wanting in them. Between the Faculties they possess, therefore, and the governing principles of the System in which they live and under which they serve, there is, as it were, a vacant space. It is no anomaly that this space should be occupied by a Being with higher powers. On the contrary, it would be the greatest of all anomalies if it were really vacant. It would be strange indeed if there were no link connecting, more closely than any of the lower animals can connect, the Mind that is in Creation with the Mind that is in the Creature. This is the place occupied by Man's Reason—Reason not outside of, but in the Creature—working not only through him, but also in him—Reason conscious of itself, and conscious of the relation in which it stands to that measureless Intelligence of which the Universe is full. In occupying this place, Man fills up, in some degree at least, what would otherwise be wanting to the Continuity of things; and in proportion as he is capable of development—in proportion as his Faculties are expanded—he does fill up this place more and more.

There is nothing, then, really anomalous or at variance with the Unity of Nature, either in the special elevation of the powers which belong to Man, or in the fact that they start from small beginnings, and are capable of being developed to an extent which, though certainly not infinite, is at least indefinite. That which is really exceptional, and indeed absolutely singular in Man, is the persistent tendency of his development to take a wrong direction. In all other creatures it is a process which follows a certain and determined law, going straight to a definite, consistent, and intelligible end. In Man alone it is a process which is prone to take a perverted course, tending not merely to arrest his progress, but to lead him back along descending paths to results of utter degradation and decay. I am not now affirming that this has been the actual course of Man as a Species or as a Race, when that course is considered

as a whole. But that it is often the course of individual men, and that it has been the course of particular races and generations of men in the history of the world, is a fact which cannot be denied. The general law may be a law of progress; but it is certain that this law is liable not only to arrest but to reversal. In truth, it is never allowed to operate unopposed, or without heavy deductions from its work. For there is another law ever present, and ever working in the reverse direction. Running alongside, as it were, of the tendency to progress, there is the other tendency to retrogression. Between these two there is a war which never ceases,—sometimes the one, sometimes the other, seeming to prevail. And even when the better and higher tendency is in the ascendant, its victory is qualified and abated by its great antagonist. For just as in Physics the joint operation of two forces upon any moving body results in a departure from the course it would have taken if it had been subject to one alone, so in the moral world almost every step in the progress of Mankind deviates more or less from the right direction. And every such deviation must and does increase, until much that had been gained is again lost in new developments of corruption and of vice. The recognition of this fact does not depend on any particular theory as to the nature or origin of moral distinctions. It is equally clear, whether we judge according to the crudest standard of the Utilitarian scheme, or according to the higher estimates of an Independent Morality. Viewed under either system, the course of development in Man cannot be reconciled with the ordinary course of Nature, or with the general law under which all other creatures fulfil the conditions of their being.

It is no mere failure to realize aspirations which are vague and imaginary that constitutes this exceptional element in the history and in the actual condition of Mankind. That which constitutes the terrible anomaly of his case admits of perfectly clear and specific definition. Man has been, and still is, a constant prey to appetites which are morbid—to opinions which are irrational—to imaginations which are horrible,—to practices which are destructive. The prevalence and the power of these in a great variety of forms and of degrees is a fact with which we are familiar—so familiar, indeed, that we fail to be duly

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impressed with the strangeness and the mystery which really belong to it. All savage races are bowed and bent under the yoke of their own perverted instincts—instincts which generally in their root and origin have an obvious utility, but which in their actual development are the source of miseries without number and without end. Some of the most horrible perversions which are prevalent among Savages have no counterpart among any other created Beings, and when judged by the barest standard of utility, place Man immeasurably below the level of the Beasts. We are accustomed to say of many of the habits of savage life that they are "brutal." But this is entirely to misrepresent the place which they really occupy in the System of Nature. None of the Brutes have any such perverted dispositions; none of them are ever subject to the destructive operation of such habits as are common among men. And this contrast is all the more remarkable when we consider that the very worst of these habits affect conditions of life which the lower animals share with us, and in which any departure from those natural laws which they universally obey, must necessarily produce, and do actually produce, consequences so destructive as to endanger the very existence of the race. Such are all those conditions of life affecting the relation of the sexes which are common to all creatures, and in which Man alone exhibits the widest and most hopeless divergence from the Order of Nature.

It fell in the way of Malthus in his celebrated work on Population to search in the accounts of travellers for those causes which operate, in different countries of the world, to check the progress, and to limit the numbers of Mankind. Foremost among these is vice, and foremost among the vices is that most unnatural one, of the cruel treatment of women. "In every part of the world," says Malthus, "one of the most general characteristics of the Savage is to despise and degrade the female sex. Among most of the tribes in America, their condition is so peculiarly grievous, that servitude is a name too mild to describe their wretched state. A wife is no better than a beast of burden. While the man passes his days in idleness or amusement, the woman is condemned to incessant toil. Tasks are imposed upon her without mercy, and services are

received without complaisance or gratitude. There are some districts in America where this state of degradation has been so severely felt that mothers have destroyed their female infants, to deliver them at once from a life in which they were doomed to such a miserable slavery." * It is impossible to find for this most vicious tendency any place among the Unities of Nature. There is nothing like it among the Beasts. With them the equality of the sexes, as regards all the enjoyments as well as all the work of life, is the universal rule. And among those of them in which social instincts have been specially implanted, and whose systems of polity are like the most civilized polities of men, the females of the race are treated with a strange mixture of love, of loyalty, and of devotion. If, indeed, we consider the necessary and inevitable results of the habit prevalent among savage men to maltreat and degrade their women,—its effects upon the constitution, and character, and endurance of children,—we cannot fail to see how grossly unnatural it is, how it must tend to the greater and greater degradation of the race, and how recovery from this downward path must become more and more difficult or impossible. But vicious, destructive, unnatural as this habit is, it is not the only one or the worst of similar character which prevail among savage men. A horrid catalogue comes to our remembrance when we think of them—polyandry, infanticide, cannibalism, deliberate cruelty, systematic slaughter connected with warlike passions or with religious customs. Nor are these vices, or the evils resulting from them, peculiar to the savage state. Some of them, indeed, more or less changed and modified in form, attain a rank luxuriance in civilized communities, corrupt the very bones and marrow of society, and have brought powerful nations to decay and death.

It is, indeed, impossible to look abroad either upon the past history or the existing condition of Mankind, whether savage or civilized, without seeing that it presents phenomena which are strange and monstrous—incapable of being reduced within the harmony of things, or reconciled with the Unity of Nature. The contrasts which it presents to the general laws and course of Nature cannot be stated too broadly. There is nothing like

* Malthus, 6th Edition, vol. i. p. 39.

it in the world. It is an element of confusion amidst universal order. Powers exceptionally high spending themselves in activities exceptionally base; the desire and the faculty of acquiring knowledge coupled with the desire and the faculty of turning it to the worst account; instincts immeasurably superior to those of other creatures, alongside of conduct and of habits very much below the level of the Beast—such are the combinations with which we have to deal as unquestionable facts when we contemplate the actual condition of Mankind. And they are combinations in the highest degree unnatural; there is nothing to account for, or to explain them in any apparent natural necessity.

The question then arises, as one of the greatest of all mysteries,—how it is and why it is that the higher gifts of Man's nature should not have been associated with corresponding dispositions to lead as straight and as unerringly to the crown and consummation of his course, as the dispositions of other creatures do lead them to the perfect development of their powers and the perfect discharge of their functions in the economy of Nature?

It is as if weapons had been placed in the hands of Man which he has not the strength, nor the knowledge, nor the rectitude of Will to wield aright. It is in this contrast that he stands alone. In the light of this contrast we see that the corruption of human nature is not a mere dogma of Theology, but a fact of science. The nature of Man is seen to be corrupt not merely as compared with some imaginary standard which is supposed to have existed at some former time, but as compared with a standard which prevails in every other department of Nature at the present day. We see, too, that the analogies of Creation are adverse to the supposition that this condition of things was original. It looks as if something exceptional must have happened. The rule throughout all the rest of Nature is, that every creature does handle the gifts which have been given to it with a skill as wonderful as it is complete, for the highest purposes of its own Being, and for the fulfilment of its part in the Unity of Creation. In Man alone we have a Being in whom this Adjustment is imperfect,—in whom this faculty is so defective as often to miss its aim. Instead of unity of law with cer-

tainty and harmony of result, we have antagonism of laws, results at the best of much shortcoming and often of hop failure. And the anomaly is all the greater when we con that this failure affects chiefly that portion of Man's na which has the direction of the rest—on which the whole re depends, as regards his conduct, his happiness, and his dest The general fact is this—first that Man is prone to set up to invent standards of Obligation which are low, false, misch ous, and even ruinous: and secondly, that when he has bec possessed of standards of Obligation which are high, and t and beneficent, he is prone, first, to fall short in the observa of them, and next, to suffer them, through various processe decay, to be obscured and lost.

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CHAPTER X.

ON THE DEGRADATION OF MAN.

It may be well, before proceeding farther in this branch of our inquiry, to retrace for a little the path we have been following, and to identify the conclusions to which we have been led.

In the first place, we have seen that the Sense of Obligation considered in itself—that is to say, considered apart from the particular actions to which it is attached—is a simple and elementary conception of the Mind, insomuch that in every attempt to analyze it, or to explain its origin and growth, this absurdity can always be detected,—that the analysis or explanation universally assumes the previous existence of that very conception for which it professes to account.

In the second place, we have seen that, just as Reason, or the logical Faculty, begins its work with the direct perception of some simple and elementary truths, of which no other account can be given than that they are intuitively perceived, or, in other words, that they are what is called "self-evident," so, in like manner, the Moral Sense begins its work with certain elementary perceptions and feelings in respect to conduct, which arise out of the very nature of things, and come instinctively to all men. The earliest of these feelings is the Obligation of obedience to that first Authority the rightfulness of which over us is not a question but a fact. The next of these feelings is the Obligation of acting towards other men as we know we should like them to act towards ourselves. The first of these feelings of Obligation is inseparably associated with the fact that all men are born helpless, absolutely dependent, and subject to Parents. The second of these feelings of Obligation is similarly founded on our conscious community of nature with other men, and on the consequent universal applicability to them of our own estimates of good and evil.

In the third place, we have seen that this association of the

higher powers of Man with rudimentary data which are supplied by the facts of Nature, is in perfect harmony with that condition of things which prevails throughout Creation,—the condition, namely, that every creature is provided from the first with just so much of instinct and of impulse as is requisite to propel and guide it in the kind and to the measure of development of which its Organism is susceptible, leading it with unfailing regularity to the fulfilment of the law of its own Being, and to the successful discharge of the functions assigned to it in the world.

In the fourth place, we have seen that the only really exceptional fact connected with Man is—not that he has faculties of a much higher kind than other creatures, nor that these faculties are susceptible of a corresponding kind and measure of development—but that in Man alone this development has a persistent tendency to take a wrong direction, leading not towards, but away from, the perfecting of his powers.

In the last place, we have seen that as a matter of fact, and as a result of this tendency, a very large portion of Mankind, embracing almost all the savage races, and large numbers of men among the most civilized communities, are a prey to habits, practices, and dispositions which are monstrous and unnatural—one test of this unnatural character being that nothing analogous is to be found among the lower animals in those spheres of impulse and of action in which they have a common nature with our own; and another test being that these practices, habits, and dispositions are always directly injurious and often even fatal to the race. Forbidden thus and denounced by the highest of all Authorities, which is the Authority of Natural Law, these habits and practices stand before us as unquestionable exceptions to the Unity of Nature, and as conspicuous violations of the general harmony of Creation.

When, however, we have come to see that such is really the character of these results, we cannot be satisfied with the mere recognition of their existence as a fact. We seek an explanation and a cause. We seek for this, moreover, in a very different sense from that in which we seek for an explanation and a cause of those facts which have the opposite character of being according to law and in harmony with the analogies of Nature.

With facts of this last kind, when we have found the place into which they fit in the order of things, we can and we do rest satisfied as facts which are really ultimate—that is to say, as facts for which no other explanation is required than that they are part of the Order of Nature, and are due to that one great cause, or to that combination of causes, from which the whole harmony and Unity of Nature is derived. But when we are dealing with facts which cannot be brought within this category,—which cannot be referred to this Order, but which are, on the contrary, an evident departure from it,—then we must feel that these facts require an explanation and a cause as special and exceptional as the results themselves.

There is, indeed, one theory in respect to those mysterious aberrations of Human Character, which, although widely prevalent, can only be accepted as an explanation by those who fail to see in what the real difficulty consists. That theory is, that the vicious and destructive habits and tendencies prevailing among men, are not aberrant phenomena at all, but are original conditions of our nature,—that the very worst of them have been primitive and universal, so that the lowest forms of savage life are the nearest representatives of the primordial condition of the race.

Now, assuming for the present that this were true, it would follow that the anomaly and exception which Man presents among the unities of Nature is much more violent and more profound than on any other supposition. For it would represent the contrast between his instincts and those of the lower animals as greatest and widest at the very moment when he first appeared among the creatures which, in respect to these instincts, are so superior to himself. And it is to be observed that this argument applies equally to every conceivable theory or belief as to the origin of Man. It is equally true whether he was a special creation, or an unusual birth, or the result of a long series of unusual births, each marked by some new accession to the aggregate of faculties which distinguish him from the lower animals. As regards the anomaly he presents, it matters not which of these theories of his origin be held. If his birth, or his creation, or his development, whatever its methods may have been, took place after the analogy of the lower animals,

then, along with his higher powers of mind, there would have been corresponding instincts associated with them to guide and direct those powers in their proper use. It is in this essential condition of all created things that Man, especially in his savage state, presents an absolute contrast with the Brutes. It is no explanation, but, on the contrary, an insuperable increase of the difficulty, to suppose that this contrast was widest and most absolute when Man made his first appearance in the world. It would be to assume that, for a most special and most exceptional result, there was no special or exceptional cause. If Man was, indeed, born with an innate propensity to maltreat his women, to murder his children, to kill and eat his fellow, to turn the physical functions of his nature into uses which are destructive to his race, then, indeed, it would be literally true that

> "Dragons of the prime,
> That tear each other in their slime,
> Were mellow music matched with him."

It would be true, because there were no dragons of the prime, even as there are no reptiles of the present age—there is no creature, however terrible or loathsome its aspect may be to us, among all the myriads of created things—which does not pass through all the stages of its development with perfect accuracy to the end, or which, having reached that end, fails to exhibit a corresponding harmony between its propensities and its powers, or between both of these and the functions it has to perform in the economy of Creation. So absolute and so perfect is this harmony, that men have dreamed that somehow it is self-caused, the need and the requirement of a given function producing its appropriate Organ, and the Organ again reacting on the requirement and the need. Whatever may be the confusion of thought involved in this idea, it is at least an emphatic testimony to the fact of an order and an adjustment of the most perfect kind prevailing in the work of what is called Evolution, and suggesting some cause which is of necessary and universal operation. The nearer therefore we may suppose the origin of Man may have been to the origin of the Brutes, the nearer also would his condition have been to the fulfilment of a law which

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is of universal application among them. Under the fulfilment of that law the higher gifts and powers with which Man is endowed would have run smoothly their appointed course, would have unfolded as a bud unfolds to flower,—as a flower ripens into fruit,—and would have presented results absolutely different from those which are actually presented either by the savage, or by what is called the civilized, condition of Mankind.

And here it may be well to define, as clearly as we can, what we mean by Civilization, because the word is very loosely used, and because the conceptions it involves are necessarily complex. Usually it is associated in our minds with all that is highest in the social, moral, and political condition of the Christian nations as represented in our own country and in our own time. Thus, for example, respect for human life, and tenderness towards every form of human suffering, is one of the most marked features of the best modern culture. But we know that this sentiment, and many others which are related to it, were comparatively feeble in the case of other societies which, nevertheless, we acknowledge to have been very highly civilized. We must, therefore, attach some more definite and restricted meaning to the word, and we must agree to understand by Civilization only those characteristic conditions which have been common to all peoples whom we have been accustomed to recognize as among the governing nations of the world. And when we come to consider what these characteristics are, we find that, though complex, they are yet capable of being brought within a tolerably clear and simple definition. The Latin word *civis*, from which our word Civilization comes, still represents the fundamental conception which is involved. The citizen of an imperial City,—the subject of an imperial Ruler,—the member of a great State,—this was the condition which constituted the Roman idea of the rank and status of Civilization. No doubt many things are involved in this condition, and many other things have come to be associated with it. But the essential elements of the civilized condition, as thus defined or understood, can readily be separated from others which are not essential. An extended knowledge of the useful arts, and the possession of such a settled system of Law and Government as enables men to live in great political communities, these are

the essential features of what we understand by Civilization. Other characteristics may co-exist with these, but nothing more is necessarily involved in a proper understanding, or even in the usual application of the word. In particular, we cannot affirm that a civilized condition involves necessarily any of the higher moral elements of character. It is true, indeed, that no great State, nor even any great City, can have been founded and built up without courage and patriotism. Accordingly these were perhaps the most esteemed virtues of antiquity. But these are by no means confined to civilized men, and are, indeed, often conspicuous in the Savage and in the Barbarian. Courage, in at least its lower forms, is one of the commonest of all qualities; and patriotism, under the like limitation, may almost be said to be an universal passion. It is in itself simply a natural consequence of the Social Instinct, common to Man and to many of the lower animals—that Instinct which leads us to identify our own passions and our own sympathies with any brotherhood to which we may belong,—whatever the associating tie of that brotherhood may be,—whether it be morally good, bad, or indifferent. Like every other instinct, it rises in its moral character in proportion as it is guided by reason and by conscience, and in proportion as, through these, it becomes identified with duty and with self-devotion. But the idea of Civilization is in itself separate from the idea of virtue. Men of great refinement of manners may be, and often are, exceedingly corrupt. And what is true of individuals is true of communities. The highest civilizations of the heathen world were marked by a very low code of morals, and by a practice even lower than their code. But the intellect was thoroughly cultivated. Knowledge of the useful arts, taste in the fine arts, and elaborate systems both of civil polity and of military organization, combined to make, first Greek, and then Roman, civilization, in such matters the basis of our own.

It is, therefore, only necessary to consider for a moment these essential characteristics of what we mean by Civilization, to see that it is a conception altogether incongruous with any possible idea we can form of the condition of our First Parents, or, indeed, of their offspring for many generations. An extended knowledge of the useful arts is of necessity the result of ac-

cumulation. Highly organized systems of polity were both needless and impossible before settled and populous communities had arisen. Government was a simple matter when the "world's gray fathers" exercised over their own children the first and the most indisputable of all authorities.

It is unfortunate that the two words which are habitually used to indicate the condition opposite to that of Civilization are words both of which have come to mean a great deal more than mere ignorance of the useful arts, or a merely rudimentary state of Law and Government. These two words are Barbarism and Savagery. Each of these has come to be associated with the idea of special vices of character and of habit, such as cruelty and ferocity. But "Barbarian," in the classical language from which it came to us, had no such meaning. It was applied indiscriminately by the Greeks to all nations, and to all conditions of society other than their own, and did not necessarily imply any fault or failure other than that of not belonging to the race, and not partaking of the culture which was then, in many respects at least, the highest in the world. St. Paul refers to all men who spoke in any tongue unknown to the Christian communities as men who were "to them barbarians." But he did not associate this term with any moral faults, such as violence or ferocity; on the contrary, in his narrative of his shipwreck on the coast of Malta, he calls the natives of that Island "barbarous people" in the same sentence in which he tells us of their kindness and hospitality. This simple and purely negative meaning of the word barbarian has been lost to us, and it has become inseparably associated with characteristics which are indeed common among uncivilized nations, but are by no means confined to them. The epithet "savage," of course, still more distinctly means something quite different from rude, or primitive, or uncultivated. The element of cruelty or of ferocity is invariably present to the mind when we speak of savagery, although there are some races—as, for example, the Eskimo—who are totally uncivilized, but who, in this sense, are by no means savage.

And this may well remind us that, as we have found it necessary to define to ourselves the condition which we are to understand by the word Civilization, so it is not less essential to define and limit the times to which we are to apply the word

Primeval. For this word also is habitually used with even greater laxity of meaning. It is often employed as synonymous with primitive, and this again is applied not only to all times which are pre-historic, but to all conditions even in our own age which are rude or savage. There is an assumption that, the farther we go back in time, there was not only less and less extensive knowledge of the useful arts,—not only simpler and simpler systems of life and polity,—but also that there were deeper and deeper depths of the special characteristics of the modern Savage. We have, however, only to consider what some of these characteristics are, to be convinced that although they may have arisen in early times, they cannot possibly have existed in the times which were the earliest of all. Things may have been done, and habits may have prevailed, when the multiplication and dispersion of Mankind had proceeded to a considerable extent, which cannot possibly have been done, and which cannot possibly have prevailed when as yet there was only a single pair of Beings "worthy to be called" man and woman, nor even when as yet all the children of that pair knew themselves to be of one family and blood. The word Primeval ought, if it is to have any definite meaning at all, to be confined to this earliest time alone. It has already been pointed out, that on the supposition that the condition of primeval Man approximated to the condition of the lower animals, that condition could not have been nearer to, but must, on the contrary, have been very much farther removed from, the condition of the modern Savage. If, for example, there ever was a time when there existed on one spot of Earth, or even on more spots than one, a single pair of human Beings, it is impossible that they should have murdered their offspring, or that they should have killed and eaten each other. Accordingly it is admitted that cannibalism and infanticide, two of the commonest practices of savage and of barbarous life, cannot have been Primeval. But this is a conclusion of immense significance. It hints to us, if it does no more, that what is true of one savage practice may possibly be true of others. It breaks down the presumption that whatever is most savage is therefore probably the most ancient.

And then, when we come to think of it, this idea, from being

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vague and general, rises into suggestions which are definite and specific. On the great fundamental subject of the relation of the sexes, conclusions not less important than those respecting cannibalism and infanticide are forced upon our conviction. We have seen that the cruel treatment of the female sex is almost universal among Savages, and that it is entirely unknown among the lower animals. It is in the highest degree improbable and unnatural to suppose that this habit can have been Primeval. But the same considerations carry us a great deal farther. They raise a presumption in favor of the later origin of other habits and customs which are not confined to the savage state, but have prevailed, and do now prevail, among nations comparatively civilized. There can have been no polygamy when as yet there was only a single pair, or when there were several single pairs widely separated from each other. The presumption, if not the certainty, therefore is, that Primeval Man must have been monogamous. It is a presumption supported by the general equality of the sexes in respect to the numbers born, with only just such an excess of the male sex as tends to maintain that equality against the greater risks to life arising out of manly pursuits and duties. Thus the facts of Nature point to polygamy as in all probability a departure from the habits of primeval times. Like considerations set aside, as in a still higher degree unnatural and improbable, the primeval rank of other customs which the historians of human culture tell us, and probably tell us truly, that there are many surviving traces among the existing customs of men. Thus "marriage by capture" cannot have been Primeval. It may be very ancient; but it cannot possibly have arisen until the family of Man had so multiplied and scattered, that they had become divided into tribes accustomed to act with violence towards each other. And then as regards a custom still more barbarous and savage, namely, that of polyandry, and that which is now euphemistically called "communal marriage," apart from the strong presumption in favor of primeval monogamy, they are stamped by many separate considerations as corruptions and as departures from primeval habits. In the first place, all such customs are fatally injurious to the propagation of the race. In the second place, they are unknown in the animal world.

In the third place, their origin can be assigned, in many cases, if not with certainty at least with the highest probability, to one cause, and that is the previously-acquired habit of female infanticide. But as regards this last habit, besides the certainty that it cannot have been Primeval, we know that it has often arisen from customs such as the exorbitant cost of marriage portions, which can only have grown up under long-developed and highly artificial conditions of society.

But powerful as all these separate considerations are to raise at least adverse presumptions against the primeval rank of the worst and commonest characteristics of savage life, the force of these considerations is much increased when we find that they are closely connected together, and that they all lead up to the recognition of a principle and a law. That principle is no other than the principle of Development; that law is no other than the law of Evolution. It is a curious misunderstanding of what that law really is, to suppose that it leads only in one direction. It leads in every direction in which there is at work any one of the "potential energies" of Nature. Development is the growth of germs, and according to the nature of the germ so is the nature of the growth. The flowers and fruits which minister to the use of Man have each their own seed, and so have the briars and thorns which choke them. Evil has its germs as well as good, and the evolution of them is accompanied by effects to which it is impossible to assign a limit. Movement is the condition of all Being, in moral as well as in material things. Just as one thing leads to another in knowledge and in virtue, so does one thing lead to another in ignorance and vice. Those gradual processes of change which arise out of action and reaction between the external condition and the internal nature of Man have an energy in them of infinite complexity and power. We stand here on the firm ground of observation and experience. In the shortest space of time far within the limits even of a single life, we are accustomed to see such processes effectual both to elevate and degrade. The weak become weaker and the bad become worse. "To him that hath more is given, and from him that hath not is taken even that which he seemeth to have." And this law, in the region of character and of morals, is but the counterpart of the law which prevails in the physical regions of

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Nature, where also Development has its double aspect. It cannot bring one Organism to the top, without sinking another Organism to the bottom. That vast variety of natural causes which have been grouped and almost personified under the phrase "Natural Selection," are causes which necessarily include both favorable and unfavorable conditions. Natural Rejection, therefore, is the inseparable correlative of Natural Selection. In the battle of life the triumph of one individual, or of one species, is the result of causes which bring about the failure of another. But there is this great distinction between the lower animals and Man,—that in their case failure involves death and complete extinction, whilst in his case it is compatible with prolonged survival. So far as mere existence is concerned, the almost infinite plasticity and adaptability of his nature enable him to accommodate himself to the hardest lot, and to the most unfavorable conditions. Man is the only animal whose possible distribution is not limited to narrow, or comparatively narrow, areas, in consequence of exclusive dependence upon particular conditions of climate and of productions. Some such conditions of a highly favorable kind may, and indeed must, have governed the selection of his birthplace and of his infancy. But when once born and fairly launched upon his course, it was in his nature to be able to prevail over all or over most of the limitations which are imposed upon the lower animals. But it is this very power of adaptation to unfavorable circumstances which involves of necessity the possibility of his development taking an equally unfavorable direction. If he can rise to any level, so also can he descend to any depth. It is not merely that faculties, for the exercise of which there is no call and no opportunity, remain dormant, but it is, also, that if such faculties have already been exercised, they may and often do become so stunted that nothing but the rudiments remain.

With such immense possibilities of change inherent in the nature of Man, we have to consider the great element of Time. Strangely enough, it seems to be very commonly assumed that the establishment of a great antiquity for the human race has some natural, if not some necessary, connection with the theory that Primeval Man stood on some level far lower even than

any existing Savage. And no doubt this connection would be a real one if it were true that during some long series of ages Development had not only been always working, but had always been working upwards. But if it be capable of working, and if it has been actually working, also in the opposite direction, then the element of Time in its bearing upon conditions of modern savagery must have had a very different operation. For here it is to be remembered that the Savage of the present day is as far removed in time from the common origin of our race as the man who now exhibits the highest type of moral and intellectual culture. Whether that time is represented by six thousand, or ten thousand, or a hundred thousand years, it is the same for both. If therefore the number of years since the origin of Man be taken as a multiplier in the processes of elevation, it must be taken equally as a multiplier in the processes of degradation. Not even on the theory which some hold, that the human species has spread from more than one centre of birth or of creation, can this conclusion be affected. For even on this hypothesis of separate origins, there is no reason whatever to suppose that the races which are now generally civilized are of more recent origin than those which are generally savage. Presumably, therefore, all the ages which have been at work in the development of Civilization have been at work equally in the development of Savagery. It is not possible in the case of Savagery, any more than in the case of Civilization, that all those ages have been without effect. Nor is it possible that the changes they have wrought have been all in one direction. The conclusion is, that neither Savagery nor Civilization, as we now see them, can represent the primeval condition of Man. Both of them are the work of time. Both of them are the product of Evolution.

When, however, this conclusion has been reached, we naturally seek for some understanding—some definite conception—of the circumstances and conditions under which Development in Man has taken a wrong direction. No similar explanation is required of the origin of Civilization. This is the development of Man's powers in the natural direction. Great interest, indeed, attaches to the steps by which know-

edge has been increased, and by which invention has been added to invention. But there is no mystery to be encountered here—no dark or distressing problem to be solved. This kind and direction of development is all according to the constitution and course of things. It is in harmony with all the analogies of Creation. Very different is the sense of painful wonder with which we seek an explanation of the wretched condition of Man in many regions of the Globe, and, still more, with which we seek the origin or the cause of all the hideous customs which are everywhere prevalent among savage men, and which often, in their ingenuity of evil, and in the sweep of their destructive force, leave it a wonder that the race survives at all.

There are, however, some considerations, and some facts, on which we may very safely advance at least a few steps towards the explanation we desire. Two great causes of change, two great elements of Development or Evolution, have been specified above—namely, the external conditions and the internal nature of Man. Let us look at them for a little separately, in so far as they can be separated at all.*

It is certain that external or physical conditions have a very powerful, and sometimes a very rapid, effect both on the body and on the mind of Man. The operation of this law has been seen and noted even in the midst of the most highly civilized communities. There are kinds of labor which have been found to exert a rapid influence in degrading the human frame, and in deteriorating the human character. So marked has been this effect, that it has commanded the attention of Parliaments, and the course of Legislation has been turned aside to meet the dangers it involved. Moreover, our experience in this matter has been very various. Different kinds of employment, involving different kinds of unfavorable influence, have each tended to develop its own kind of mischief, and to establish its own type of degradation. The particular conditions which are unfavorable may be infinitely various. The evils which arise out of the abuses of civilized life can never be identical with the evils to which the earlier races of Mankind may have been ex-

* The argument which follows was urged in a former work on "Primeval Man." It has been here re-written and re-considered with reference to various objections and replies.

posed. But the power of external conditions in modifying the form, and in moulding the character of men, is stamped as a general law of universal application.

In connection with this law, the first great fact which calls for our attention is the actual distribution of Mankind in relation to the Physical Geography of the Globe. That distribution is nearly universal. From the earliest times when civilized men began to explore distant regions, they found everywhere other races of men already established. And this has held true down to the latest acquisitions of discovery. When the New World was discovered by Columbus, he found that it must have been a very old world indeed to the human species. Not only every great Continent, but, with rare exceptions, even every habitable Island, has been found peopled by the genus HOMO. The explorers might find, and in many cases did actually find, everything else in Nature different from the country of their birth. Not a beast, or bird, or plant,—not an insect, or a reptile, or a fish, might be the same as those of which they had any previous knowledge. The whole face of Nature might be new and strange—but always with this one solitary exception, that everywhere Man was compelled to recognize himself—represented, indeed, often by people of strange aspect and of strange speech, but by people nevertheless exhibiting all the unmistakable characters of the human race.

In ancient times, before the birth of physical science, this fact might not appear so singular and exceptional as it really is. Before Man had begun to form any definite conceptions as to his own origin, or as to his place in Nature, it was easy to suppose in some vague way that the inhabitants of distant regions were "Aborigines," or, as the Greeks called them, "Autocthonoi"—that they were somehow native to the soil, and had sprung from it. But this conception belongs essentially to that stage and time when tradition has been lost, and before reasoning has begun. Those who refuse to accept the Jewish Scriptures as in any sense authoritative, must at least recognize them as the records of a very ancient and a very sublime Cosmogony. That Cosmogony rests upon these four leading ideas—first, that the Globe has been brought to its present condition through Days of Change; secondly, that from a state

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which can only be described as Chaos, it came to be divided into Sea, and Land, and Atmosphere; thirdly, that the lower animals were born first,—Man being the last as he is the highest product of Creation; fourthly, that he appeared first at one place only in the world, and that from one pair has all the Earth been overspread.

It is remarkable that in this general outline of events, and especially in the unity of Man's origin, the progress of discovery, and those later speculations which have outrun discovery, are in strict accordance with the tradition recorded by the Jewish Prophets. There are, indeed, some scientific men who think that different races of men represent different species—or, at least, that if Man be defined as one species, it is a species which has spread from more than one place of origin. But those who hold to this idea are men who stand outside the general current of scientific thought. The tendency of that thought is more and more to demand unity and simplicity in our conception of the Methods of Creation, and of the order of events through which the birth of Species has been brought about. So strong is this tendency, and so intimately connected is it with the intellectual conceptions on which the modern theory of Development has been founded, that Mr. Darwin himself, and Mr. Wallace, who may be said to be joint-author with him of that theory, both lay it down as a fundamental postulate, that each new Organic Form has originated, and could only originate, at one place. This doctrine is by no means a necessity of thought, nor is it a necessary consequence of the theory of Development. It rests mainly on the doctrine of chances,* and that doctrine may be wholly inapplicable to events which are governed not by accident but by Law. It is, however, a postulate of the particular form of that theory which Mr. Darwin has adopted. It is not always easy to reconcile this postulate with the existing distribution over the Globe of animal Forms. But it is not absolutely inconsistent with the facts so far as we know them; and it is interesting to observe how universally and tacitly it is assumed in all the current explanations of the history of Creation.

* In this passage I rely on a private letter to myself from Mr. Darwin, in which he rested the conclusion referred to upon the chances against the same Form becoming developed in more places than one.

On this point, therefore, of the unity of Man's origin, those who bow to the authority of the most ancient and the most venerable of traditions, and those who accept the most imposing and the most popular of modern scientific theories, are found standing on common ground, and accepting the same result.

And when we come to consider a very curious subject, namely, the configuration of the habitable Continents of the Globe, we find that this configuration stands in a very intelligible relation to the dispersion of Mankind from a single centre. If, indeed, we could suppose that the earliest condition of our race was a condition of advanced knowledge in the useful arts, there would be no difficulty to solve. The great Oceans of the world are now the easiest highways of travel and consequently of dispersion. The art and the science of navigation has made them so. But we cannot imagine that this art or this science was known to our forefathers of a very early age. Various means of crossing narrow waters, from the use of solid logs of wood to the use of the same logs when hollowed out, and so to the use of canoes and boats, were in all probability among the very earliest of human inventions. But not the less would it have been impossible with these inventions to cross the Atlantic, or the Pacific, or the Indian Ocean, or even many of the more limited tracts of Sea which now separate so many habitable regions. Some other solution must be found for the problem presented by the fact that the earliest navigators who traversed those Seas and Oceans, have always found the lands on the other side already colonized, and in some cases thickly inhabited by races and nations which had made considerable advances in civilization. Yet, this problem presents no serious difficulty in accepting the unity of the human race, when it is regarded in the light of Physical Geography.

The distribution of the larger tracts of Land and Sea upon our Planet is very singular indeed. Attached to the southern Pole there is no mass of Land which stretches so far north as to enter the latitudes which are even moderately temperate. In the centre of the Antarctic Circle there is probably a great Continent. But it is a Continent where volcanic fires burst here and there through surfaces which are bound in perpetual ice. Round that vast Circle roll the continuous waves of an

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Ocean vexed by furious storms, and laden with the gigantic wrecks of immeasurable fields and cliffs of ice. In the northern hemisphere, round the Arctic Circle, on the contrary, everything is different. There Land-masses begin, which stretch southward without a break through all the temperate and through all the torrid zones on both sides of the Equator. Then, again, all these great Continents of the Globe, as they extend towards the south, become narrower and narrower, and so tend to become more and more widely separated from each other by vast oceanic spaces. Towards the north, on the contrary, all these Continents converge, and at one point, Behring's Straits, they approach so near each other, that only a space of some forty miles of sea intervenes between them. The result is, that in the northern hemisphere there is either a continued connection by land, or a connection severed only by comparatively narrow channels, between all the great inhabited Continents of the world. The consequences of this, as bearing on the dispersion of Mankind, are obvious at a glance. If, for example, Man may be supposed to have been born in any part of Western or Central Asia, it is easy to see how his earliest migrations might lead him without serious difficulty into every one of the lands in which his children have been actually found. The Indian Peninsula was at his feet. A natural bridge, as it were, would enable him to penetrate the Arabian deserts, and would conduct him by the glorious valley of the Nile into the heart of the Continent of Africa. Eastwards he had before him the fertile tracts of China, and beyond the narrow passage of Behring's Straits lay that vast Continent which, when re-discovered from the West, was called the New World. Again, beyond the southern spurs of the great Asiatic Continent there lay an Archipelago of magnificent Islands, with comparatively narrow Seas between them, and connected by a continuous chain with the continental Islands of Australasia. The seafaring habits which would spring up among an insular population,—especially in an Archipelago where every volcanic cone and every coral reef rising above the waves was rich in the products of a bounteous vegetation,—would soon lead to a rapid development of the arts of navigation. When these were once acquired, there is no difficulty in accounting for the grad-

ual dispersion of the human race among the beautiful Islands of the Pacific. Across its comparatively peaceful waters it is not improbable that even rude navigators may have made their way at various times to people the western shores of the Continent of America.

It is true indeed that the science of Geology teaches us that the distribution of Sea and Land has been immensely various in different epochs of the unmeasured ages which have been occupied in the formation of our existing world. And it may be urged from this that no argument on the methods of dispersion can be based with safety upon that distribution as it now is. There is not much force, however, in this plea. For it is equally true that the evidence afforded by Geology is in favor of the very great antiquity of the principal Land-masses, and of the great Oceanic hollows which now divide them. The antiquity of these is almost certainly much greater than the antiquity of Man. The fauna and the flora of the principal Continents indicate them to have been separated since a period in the development, or in the creation of Species, long anterior to any probable estimate of the time of Man's appearance. Even if that appearance dates from the Miocene epoch in Geology,—which is an extreme supposition,—no great difference in the problem of the dispersion of our species would arise. Since that time indeed it is certain that great subsidences and elevations of land have taken place. But although these changes have greatly altered the outlines of Sea and Land along the shores of Europe and of America, there is no reason to believe that they could have materially affected, either injuriously or otherwise, the earlier migrations of Mankind.

But although the peculiar Physical Geography of the Globe makes it easy to understand how, from a single centre, it must have been quite possible for a creature with the peculiar powers and faculties of Man to distribute himself, as he has actually been found distributed over every habitable region of the world, it is most important to observe the very adverse conditions to which, in the course of this distribution, particular portions of the human family must have been, and to which we do now find them actually exposed.

The "New World"—the American Continent—is that which

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presents the most uninterrupted stretch of habitable land from the highest northern to the lowest southern latitude. No part of it was without human inhabitants when the civilized children of the Old World first came upon it, and when, from its mountain tops, they first "stared on the Pacific." On its extreme north there was the Eskimo or Inuit race, maintaining human life under conditions of extremest hardship, even amid the perpetual ice of the Polar regions. On the extreme south—at the opposite extremity of the great American Continent—there were the inhabitants of Cape Horn and of the Island off it, both of which project their desolate rocks into another of the most inhospitable climates of the world. Let us take this case first—because it is a typical one, and because it happens that we have from a masterhand a description of these people, and a suggestion of the questions which they raise. The natives of Tierra del Fuego are one of the most degraded among the races of Mankind. How could they be otherwise? "Their country," says Mr. Darwin, "is a broken mass of wild rocks, lofty hills, and useless forests; and these are viewed through mists and endless storms. The habitable land is reduced to the stones of the beach. In search of food they are compelled to wander unceasingly from spot to spot; and so steep is the coast that they can only move about in their wretched canoes." They are habitual cannibals, killing and eating their old women before they kill their dogs, for the sufficient reason, as explained by themselves, "Doggies catch others: old women, no." Of some of these people who came round the *Beagle* in their canoes the same author says: "These were the most wretched and miserable creatures I anywhere beheld. They were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbor not far distant, a woman who was suckling a new-born child, came one day alongside the vessel and remained there out of mere curiosity, whilst the sleet fell and thawed on her naked bosom, and on the skin of her naked baby. These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, and their gestures violent. Viewing such men, one

can hardly make one's self believe that they are fellow-creatures and inhabitants of the same world." Such are the facts, or one aspect of the facts, connected with this people. But there are other facts, or another aspect of the same facts, not less important which we have on the same evidence. Beneath this crust of Savagery lay all the perfect attributes of Humanity—ready to be developed the moment the unfavorable conditions of Fuegian life were exchanged for conditions which were different. Captain Fitzroy had, in 1830, carried off some of these poor people to England, where they were taught the arts and the habits of Civilization. Of one of those who was taken back to his own country in the *Beagle*, Mr. Darwin tells us that "his intellect was good," and of another that he had a "nice disposition."

Let us look now at the questions which the low condition of the Fuegians suggests to Mr. Darwin. "Whilst beholding these Savages, one asks whence have they come? What could have tempted, or what change compelled, a tribe of men to leave the fine regions of the north, to travel down the Cordillera or backbone of America, to invent and build canoes which are not used by the tribes of Chili, Peru, and Brazil, and then to enter one of the most inhospitable countries within the limits of the Globe?"

These questions of Mr. Darwin, it will be observed, assume that Man is not indigenous in Tierra del Fuego. They assume that he has come from elsewhere into that savage country. They assume farther that his access to it has been by land. They assume that the progenitors of the Fuegians who first came there were not skilled navigators like the crew of the *Beagle*, able to traverse the Atlantic or the Pacific in their widest and stormiest expanse. These assumptions are surely safe. But these being accepted, it follows that the ancestors of the Fuegians must have come from the North, and must have passed down the whole length, or a great part of the length, of the American Continent. In other words, they must have come from regions which are highly favored into regions of extremest rigor. If external circumstances have any influence upon the condition of Man, this great change cannot have been without effect. Accordingly, Mr. Darwin at once, instinctively as it

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were, connects the utter savagery of the Fuegians with the wretched conditions of their present home. "How little," he says, "can the higher powers of the mind be brought into play! What is there for imagination to picture, for reason to compare, for judgment to decide upon." It is in perfect accordance with this view that on every side of them, and in proportion as we pass northwards from their wretched country, we find that the tribes of South America are less wretched, and better acquainted with the simpler arts. None of the depressing and stupefying conditions which attach to the present home of the Fuegians can be alleged of the regions in which some distant ancestors of the Fuegians must have lived. In Chili, in Peru, in Brazil, in Mexico, there are boundless tracts in which every condition of nature, soil, climate, and productions, are comparatively as favorable to men as they are unfavorable on the desolate shores of Cape Horn and Tierra del Fuego. Yet one or other of these many well-favored regions must have been on the line of march by which the Fuegian shores were reached. One and all of them present attractions which must have induced a long encampment, and must have made them the home of many generations. Why was that march ever resumed in a direction so uninviting and pursued to a destination so desolate and so miserable?

But the moment we come to ask this question in respect to the Fuegians, we find that it is a question which arises equally out of the position and life of many other portions of the human family. The northern extremity of the American Continent presents exactly the same problem as the southern. If it is impossible to suppose that Man was first created, or born, or developed in Tierra del Fuego, it is not less impossible to suppose that he made his first appearance on the frozen shores of Baffin's Bay. Watching at the blow-hole of a Seal for many hours in a temperature of 75° below the freezing point, is the constant work of the Inuit hunter. And when at last his prey is struck, it is his greatest luxury to feast upon the raw blood and blubber. To civilized Man it is hardly possible to conceive a life so wretched, and in some aspects at least so brutal, as the life led by this race during the continual night of the Arctic winter. Not even the most extravagant theorist as regards the

possible plurality of human origins can believe that there was a separate Eskimo Adam. Man, therefore, is as certainly an immigrant into the dreary regions round the Pole as he is an immigrant into the desolations of Cape Horn. But the whole conditions of his life there are necessarily determined by the rigors of the climate. They are conditions in which Civilization, as it has been here defined, is impossible. And the importance of that definition is singularly apparent in the case of the Eskimo. Although essentially uncivilized, he is not, in the ordinary sense of the word, a Savage. Many of the characteristics usually associated with that word are altogether wanting in the Eskimo. They are a gentle, inoffensive, hospitable, and truthful race. They are therefore a conspicuous example of the fallacy of supposing that there is any necessary connection between a backward condition of knowledge in the useful arts, and violent dispositions, or ferocious and cruel habits. Men are not necessarily savage because they may use flint hatchets, or because they may point their arrows and their spears with bone. Nevertheless, the condition of the Eskimo, although not savage, is almost the type of the merely uncivilized condition of Mankind. It is a condition in which not more than a few families can ever live together, and in which therefore large communities cannot be formed. A few simple and some very curious rules of ownership are all that can represent among them the great lawgiving instinct which lives in Man. Agriculture cannot be practised, nor even the pasturing of flocks and herds. Without fuel, beyond the oil which feeds their feeble lamps, or a few stray logs of drift timber, the Eskimo can have no access to the metals, which in such a country could not be reduced from their ores, even if these ores were themselves obtainable. The useful arts are, therefore, strictly limited to the devising and making of canoes and of weapons of the chase. There is no domestic animal except the Dog; and Dogs, too, like their masters, must have been brought from elsewhere. These are all conditions which exclude the first elements of what we understand by Civilization. But every one of these conditions must have been different with the progenitors of the Eskimo. If they were immigrants into the regions within the Arctic Circle, they must have come from the more temperate regions of

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the South. They must have been surrounded there by all the natural advantages of which their descendants are now deprived. To what extent these ancestors of the Eskimo may have profited by their very different and more favored position, we cannot know. They may have practised such simple agriculture as was practised by the most ancient races which have left their traces in the Swiss Lake dwellings. They may have been nomads, living on their flocks and herds, as the Laplanders and Siberians actually are who in the Old World live in latitudes only a little farther South. They may have been people who, like the ancient but unknown Mound-builders in the Southern and Western States of America, had developed a comparatively high civilization. But one thing is certain, that they must have lived a life wholly different from the life of the Eskimo, and that they must have had completely different habits. Whatever arts the fathers knew, suited to more genial climates, could not fail to be forgotten by the children, in a country where the practice of them was impossible.

The same question, therefore, which Darwin asks in respect to the inhabitants of the extreme south of the American Continent, arises in respect to the inhabitants of its extreme north —What can have induced any people to travel along that Continent in a direction more and more inhospitable, and at last to settle in a country where nearly one-half the year is night, and where, even during the short summer, both Sea and Land are mainly occupied by ice and snow?

But, again, we are reminded that there are other cases of a similar kind. The African Continent does not extend so far south as to reach a severe southern latitude. In that Continent, accordingly, beyond the frequent occurrence of deserts, there is nothing seriously to impede the migrations of Man from its northern towards its southern extremity ; nor is there anything there to subject them when they had reached it to the worst conditions. Accordingly we do not find that the predominant native races of Southern Africa rank low in the scale of humanity. Those among them, however, which are or were the lowest in that scale, were precisely those who occupied the most unfavorable portion of the country and are known as Bushmen. Of these it is well ascertained that they are not a

distinct race, but of kindred origin with the Hottentots, who were by no means so degraded. On the whole, therefore, the question how men could ever have been induced to live where we actually find them, does not press for an answer so much in respect to any part of the Continent of Africa, with the exception of a few tribes whose present habitat is exceptionally unfavorable.

There is, however, another case of difficulty in respect to the distribution of Mankind, which in some respects is even more remarkable than the case of the Fuegians, or the case of the Eskimo. We have seen that the great Asiatic Continent, though it does not itself extend beyond latitudes which are favorable to human settlement, is practically prolonged through a continuous chain of Islands into the regions of Australasia. Every part of those regions was found to be inhabited when they were discovered by civilized Man; and it is universally admitted that the natives of Australia, and the natives of Tasmania, are or were (for the Tasmanians are now extinct) among the very lowest of all the families of Man. Now the physical conditions of the great Islands of Australasia are in many respects the most remarkable on the surface of the Globe. Their peculiar fauna and flora prove them to be of great antiquity as Islands in the geological history of the Earth. That is to say—their beasts, and their birds, and their vegetation are so widely separate from those of all other regions, that during long ages of the total time which has elapsed since they first appeared above the Ocean, they must have been as separate as they are now from all other habitable lands. Their beasts are, indeed, related—closely related—to Forms which have existed during certain epochs in many other portions of the Earth's surface. But those epochs are so distant, that we are carried back in our search for creatures like them to the times of the Secondary Rocks—to the horizon of the Oolite.

Speaking of the poverty and of the extremely isolated character of the Australian Mammalia, Mr. Wallace says: "This class affords us the most certain proofs that no part of the country has been united to the Asiatic continent since the

latter part of the Mesozoic period of geology."* Of the vast series of creatures which elsewhere have been created, or born, or developed, since that epoch, including all the higher members of the Mammalian Class, not one existed in Australasia until they were introduced by Europeans. Among the grasses there were none which by cultivation could be developed into Cereals. Among the beasts there was not one which was capable of domestication. There were no Apes or Monkeys; no Oxen, Antelopes, or Deer; no Elephants, Rhinoceroses, or Pigs; no Cats, Wolves, or Bears; none even of the smaller Civets or Weasels; no Hedgehogs or Shrews; no Hares, Squirrels, or Porcupines, or Dormice." † There was not even a native Dog; and the only approach to, or representative of, that wonderful animal, was a low Marsupial beast, which is a mere biting machine, incapable of affection for a master, and incapable even of recognizing the hand that feeds it. In the whole of Australia, with the exception of a few Mice, there was not one single Mammal which did not belong to this low Marsupial Class, whilst some others belonged to a class still lower in the scale of organization, the class called Monotremita. Strange Forms astonished our first explorers, such as the Ornithorhynchus and the Echidna—Forms which combined features elsewhere widely separated in the animal kingdom—the bills of Birds, the spines of Porcupines, the fur of Otters, and the feet of Moles. Nothing analogous to these relics of an extinct fauna had been known to survive in any other part of the world.

Yet in the midst of this strange assemblage of creatures, without any representative of the animals which elsewhere surround him, the familiar Form of Man was found, low, indeed, in his condition, but with all the inalienable characteristics of his race. It is true, that everywhere the gap which separates Man from the lower animals is enormous. Nothing bridges, or comes near to bridging it. It is a gap which has been well called a gulf. But in Australasia the breadth and depth of this gulf is rendered more conspicuous by the association of Man with a series of animals absolutely wanting in those higher

* "Australasia," by Alfred R. Wallace, p. 51.
† Ibid.

members of the Mammalian Class which elsewhere minister to his wants, and the use of which is among the first elements of a civilized condition. Alone everywhere, and separate from other Beings, Man is most conspicuously alone in those strange and distant lands where his high Organization is in contact with nothing nearer to itself than the low Marsupial brain.

To those who connect the origin of Man with the theory of Development or Evolution, in any shape or in any form, these peculiar circumstances respecting the fauna of Australasia indicate beyond all doubt that Man is not there indigenous. They stamp him as an immigrant in those regions—a wanderer from other lands. Nor will this conclusion be less assuredly held by those who believe that in some special sense Man has been created. There is something more than an incongruity in supposing that there was a separate Tasmanian Adam. The belief that the creation of Man has been a special work is not inconsistent with the belief that in the time, and in the circumstances, and in the method of this work, it had a definite relation to the previous course and history of Creation—so that Man did not appear until all these lower animals had been born, which were destined to minister to his necessities, and to afford him the means and opportunities for that kind of development which is peculiarly his own. On the contrary, this doctrine of the previous creation of the lower animals, which is, perhaps, more firmly established on the facts of science than any other respecting the origin of Man, is a doctrine fitting closely into the fundamental conceptions which inspire the belief that Man has been produced by operations as exceptional as their result. And so it is, that when we see men inhabiting lands destitute of all the higher Mammalia, which are elsewhere his servants or companions—destitute even of those productions of the vegetable kingdom, which alone repay the cultivation of the soil, we conclude with certainty that he is there a wanderer from some distant lands, where the work of creation had been carried farther, and where the provisions of surrounding Nature were such as to afford him the conditions of a home.

We see, then, that the question asked by Mr. Darwin, in respect to the Fuegians, is a question arising equally in respect

to all the races who inhabit regions of the Globe, which from any cause present conditions highly unfavorable to Man. Just as Mr. Darwin asked, what could have induced tribes to travel down the American Continent to a climate so rigorous as Cape Horn?—just as we have asked, on the same principle, what could have induced men to travel along the same Continent in an opposite direction till they reached and settled within the Arctic Circle?—so now we have to ask, what could have induced men to travel from Asia, or from the rich and splendid Islands of the Eastern Archipelago, and to take up their abode in Australasia?

In every one of these cases the change has been greatly for the worse. It has been a change not only involving comparative disadvantages, but positive disabilities—affecting the fundamental elements of Civilization, and subjecting those who underwent that change to deteriorating influences of the most powerful kind.

It follows from these considerations as a necessary consequence that the present condition of the Australian, or the recent condition of the Tasmanian, cannot possibly be any trustworthy indication of the condition of their ancestors, when they lived in more favored regions. The same argument applies to them which, as we have seen, applies to the Fuegians and the Eskimo. If all these families of Mankind are the descendants of men, who at some former time inhabited countries wholly different in climate, and in productions, and in all the facilities which these afford for the development of the special faculties of the race, it is in the highest degree improbable that a change of habitat so great should have been without a corresponding effect upon those over whom it passed. Nor is it a matter of doubt or mere speculation that this effect must have been in the highest degree unfavorable. The conclusion, therefore, to which we are led is, that such races as those which inhabit Australasia, are indeed the results of Development, or of Evolution—but of the development of unfavorable conditions and of the evolution of the natural effects of these. Instead of assuming them to be the nearest living representatives of Primeval Man, we should be more safe in assuming them to represent the widest departure from that earliest condition of

our race which, on the theory of Development, must of necessity have been associated at first with the most highly favorable conditions of external Nature.

Of one thing, at least, we may be tolerably certain respecting the causes which have led to this extreme dispersion of Mankind to inhospitable regions, at a vast distance from any possible centre of their birth. The first Fuegian was not impelled to Cape Horn by the same motives which impelled Mr. Darwin to visit that country in the *Beagle*. The first Eskimo, who wintered on the shores of Baffin's Bay, was not induced to do so for the same reasons which led to the expeditions of Back, of Franklin, or of Rae. The first inhabitants of Australasia did not voyage there under conditions similar to those which attended the voyages of Tasman or of Cook. We cannot suppose that those distant shores were first colonized by men possessed with the genius, and far advanced in the triumphs of modern Civilization. Still less can we suppose that they went there under the influence of that last development of Man's intellectual nature, which leads him to endure almost any suffering in the cause of purely scientific investigation.

Nor is this the only solution of the difficulty which seems to be absolutely excluded by the circumstances of the case. Within the historical period, and in the dim centuries which lie immediately beyond it, we know that many lands have been occupied by conquering races coming from a distance. Sometimes they came to subdue tribes which had long preceded them in occupation, but which were ruder, as well as weaker, than themselves. Sometimes, as in the case of the northern nations bursting in upon the Roman Empire, they came to overthrow a Civilization which had once been, and in many ways still was, much higher than their own, but which the progress of development in a wrong direction had sunk in degradation and decay. Sometimes they came simply to colonize new lands, at least as favored, and generally much more favored, than their own—bringing with them all the resources of which they were possessed—their flocks and herds, their women and children, as well as their warriors with chariots and horses. Such was the case with some of those nations which at various times have held their sway from Central Asia into Eastern and

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Central Europe. They were nations on the march. But no movement of a like kind has taken place for many centuries. Lastly, we have the emigrations of our own day, when civilized men, carrying with them all the knowledge, all the requirements, and all the materials of an advanced Civilization, have landed in countries which by means of these could be made fit for settlement, and could be converted into the seats of agriculture and of commerce.

Not one of these cases can reasonably be supposed to have been the case of the first arrival of Man in Australasia. The natural disadvantages of the country, as compared with the richness and abundance of the regions from which he must have come, or which were on his southward line of march, preclude the supposition that men were attracted to it by natural objects of desire. We know by experience that if the first settlers had been in a condition to bring with them the higher animals which abound in Asia, these animals would have flourished in Australia as they now do. And so also, with reference to the Cereals—if these had ever been introduced, the modern Australians would not have been wholly without them, and would not have been compelled to live so much on the lowest kinds of animal and vegetable food,—on fish, lizards, grubs, snakes, and the roots of ferns.

There is, however, one answer to Mr. Darwin's question, which satisfies all the conditions of the case. There is one explanation and only one, of the dispersion of the human race to the uttermost extremities of the habitable Globe. The secret lies in that great law which Malthus was the first to observe and to establish—the law, namely, that population is always pressing on the limits of subsistence. There is a constant tendency to multiplication beyond those limits. And, among the many consequences of this tendency, the necessity of dispersion stands first and foremost. It is true, indeed, that under some conditions, such as those which have been already indicated, the most energetic races, or the most energetic individuals, have been those who moved. But under many other conditions the advantage has been in favor of those who stayed. Quarrels and wars between tribe and tribe, induced by the mere increase of numbers, and by consequent pressure upon

the means of living, have been always, ever since Man existed, driving the weaker individuals and the weaker families farther and farther from the original settlements of Mankind.

Then one great argument remains. In the nature of things the original settlements of Man must of necessity have been the most highly favored in the conditions he requires. If, on the commonly received theory of Development, those conditions produced him, they must have reached, at the time when, and in the place where he arose, the very highest degree of perfect adaptation. He must have been happy in the circumstances in which he found himself placed, and presumably he must have been contented to remain there. Equally on the theory of Man being a special creation, we must suppose that when weakest and most ignorant he must have been placed in what was to him a garden—that is to say, in some region where the fruits of the Earth were abundant and easily accessible. Whether this region were wide or narrow, he would not naturally leave it except from necessity. On every possible supposition, therefore, as to the origin of Man, those who in the dispersion of the race were first subjected to hard and unfavorable conditions would naturally be those who had least strength to meet them, and upon whom they would have accordingly the most depressing effect. This is a process of Natural Rejection which is the inseparable correlative of the process of Natural Selection. It tends to development in a wrong direction by the combined action of two different circumstances which are inherent in the nature of the case. First, it must be always the weaker men who are driven out from comfortable homes; and, secondly, it must be always to comparatively unfavorable regions that they are compelled to fly. Under the operation of causes so combined as these, it would be strange, indeed, if the physical and mental condition of the tribes which have been exposed to them should remain unchanged. It is true, indeed, that adverse conditions, if they be not too severe, may develop energy, and result in the establishment of races of special hardihood. And in many cases this has been the actual result. But, on the other hand, if physical conditions be as insuperable as those which prevail in Tierra del Fuego or in Baffin's Bay; or if, though less severe than these, they are nevertheless

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too hard to be overcome by the resources at the disposal of the men who are driven to encounter them, then the battle of life becomes a losing one. Under such circumstances, degradation is unavoidable. As surely as the progress of Man is the result of Opportunity, that is to say, as surely as it is due to the working of his faculties under stimulating and favoring conditions, so surely must he descend in the scale of Intelligence and of culture, when that opportunity is taken from him, and when these faculties are placed under conditions where they have no call to work.

It is, then, easy to see some at least of the external circumstances which, first, in the natural course of things, would bring an adverse influence to bear upon Mankind. Here we are on firm ground, because we know the law from which comes the necessity of migrations, and the force which has propelled successive generations of men farther and farther in ever-widening circles round the original centre or centres of their birth. Then, as it would be always the feebler tribes which would be driven from the ground which has become overstocked, and as the lands to which they went forth were less and less hospitable in climate and productions, the struggle for life would be always harder. And so it would generally happen, in the natural course of things, that the races which were driven farthest would become the rudest and the most engrossed in the pursuits of mere animal existence.

Accordingly, we find that this key of principle fits into and explains many of those facts in the distribution and condition of Mankind, which, in the case of the Fuegians, excited the wonder and curiosity of Darwin. In the light of this explanation, these facts seem to take form and order. It is a fact that the lowest and rudest tribes in the population of the Globe have been found, as we have seen, at the farthest extremities of its larger Continents, or in the distant Islands of its great Oceans, or among the hills and forests which in every land have been the last refuge of the victims of violence and misfortune. Those extreme points of land which in both hemispheres extend into severe latitudes are not the only portions of the Globe which are highly unfavorable to Man. There are other regions quite as bad, if not, in some respects, even worse. In the dense,

uniform, and gloomy forests of the Amazon and Orinoco there are tribes which seem to be among the lowest in the world. It cannot be unconnected with the savagery of the condition to which they have been reduced that we find the remarkable fact that all those regions of Tropical America are wholly wanting in the animals which are capable of domestication, and which are inseparable from the earliest traces of human culture. The Ox, the Horse, and the Sheep are all absent—even as regards the genera to which they belong. There are indeed the Tapir, the Paca, and the Curassow Turkey, and all these are animals which can be tamed. But none of them will breed in confinement, and the races cannot be established as useful servants of Mankind. In contrast with these and with other insuperable disadvantages of men driven into the forests of Tropical America, it is instructive to observe that the same races, where free from these disadvantages, were never reduced to the same condition. In Peru the Indian races had the Llama, and had also an advanced Civilization.* In India, too, it is always the Hill Tribes who furnish the least favorable specimens of our race. But in every one of these cases we have the presence of external circumstances and physical conditions which are comparatively unfavorable. It is quite certain that these conditions must have had their own effect. It is equally certain that the races which have been subject to them for a long and indefinite time must have been once under the influence of conditions much more favorable; and the inevitable conclusion follows, that the savagery and degradation of their existing state is to a great extent the result of development in a wrong direction.

There are other arguments all pointing the same way, the force of which cannot be fully estimated, except by those who are familiar with some of the fundamental conceptions which seem to rise unbidden in the mind from the facts which geology has revealed touching the history of Creation. One of these facts is that each new Organic Form, or each new variety of birth, seems always to have been introduced with a wonderful energy of life. It is needless to repeat that this fact stands in close connection with every possible theory of Evolution. If these new Forms were the product of favoring conditions, the

* "Naturalist on the Amazons," Bates, vol. i. p. 191–3.

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prevalence of these conditions would start them with force upon their way. The initial energy would be great. Where every condition was favorable—so favorable indeed that the new birth is assumed to have been nothing but their natural result—then the newly-born would be strong and lusty. And such, accordingly, is the fact in that record of Evolution or of Creation which Palæontology affords. The vigor which prevails in the youth of an individual is but the type of the vigor which has always prevailed in new and rising species. All the complex influences which led to their being born, led also to their being fat and flourishing. That which caused them to arise at all must have had the effect of causing them to arise in strength. The condition of all the lowest races of men is in absolute contrast with everything which this law demands. Everywhere, and in everything, they exhibit all the characteristics of an energy which is spent—of a force which has declined—of a vitality which has been arrested. In numbers they are stationary, or dwindling, in mind they are feeble and uninventive; in habits they are stupid or positively suicidal.

It is another symptom of a wrong development being the real secret of their condition that the lowest of them seem to have lost even the power to rise. Though individually capable of learning what civilized men have taught them, yet as races they have been invariably scorched by the light of Civilization, and have withered before it like a plant whose roots have failed. The power of assimilation seems to have departed, as it always does depart from an Organism which is worn out. This has not been the result with races which, though very barbarous, have never sunk below the pastoral or the agricultural stage. It is remarkable that the Indian races of North America are perhaps the highest which have exhibited this fatal and irredeemable incapacity to rise: and it is precisely in their case that we have the most direct evidence of degradation by development in a wrong direction. There are abundant remains of a very ancient American Civilization, which was marked by the construction of great public works and by the development of an agriculture founded on the Maize, which is a cereal indigenous to the Continent of America. This Civilization was subsequently destroyed or lost, and then succeeded a period in which

Man relapsed into partial barbarism. The spots which had been first forest, then, perhaps, sacred monuments, and thirdly, cultivated ground, relapsed into forest once more.* So strong is this evidence of degradation having affected the population of a great part of the American Continent, that the distinguished author from whom these words are quoted, and who generally represents the Savage as the nearest living representative of primeval Man, is obliged to ask, "What fatal cause destroyed this earlier civilization? Why were these fortifications forsaken—these cities in ruins? How were the populous nations which once inhabited the rich American valleys reduced to the poor tribes of savages whom the European found there? Did the North and South once before rise up in arms against one another? Did the terrible appellation, the 'Dark and Bloody Land,' applied to Kentucky, commemorate these ancient wars?"† Whatever may have been the original cause, the process of degradation has been going on within the historic period. When Europeans first came in contact with the Indian tribes, there was more agriculture among them than there is now. They have long descended to the condition of pure hunters. The most fundamental of all the elements of a civilized and settled life—the love and practice of agriculture—has been lost. Development in the wrong direction had done its work. There is no insoluble mystery in this result. It is, in all probability, if indeed it be not certainly, attributable to one cause, that of internecine and devastating wars. And these again are the result of a natural and universal instinct which has its own legitimate fields of operation, but which like all other human instincts is liable to degenerate into a destructive passion. The love of dominion is strong in all men, and it has ever been strongest in the strongest races. But the love of fighting and of conquest very often sinks into a mere lust of blood. The natural rivalry of different communities may become such implacable hatred as to be satisfied with nothing short of the extermination of an enemy. Inspired by this passion, particular races or tribes have sometimes acquired a power and a ferocity in fighting, against which other tribes of a much higher char-

* Lubbock, "Prehistoric Times," p. 234.
† Ibid. p. 236.

acter and of a much more advanced civilization have been unable to contend.

This is no fancy picture. It is a mistake to suppose that the decline of Civilization in the American Continent has been due to the invasion of it by Europeans since the discovery of Columbus. Just as the older civilization of that Continent was an indigenous Civilization founded on the cultivation of a cereal peculiar to America, so also does the decay and loss of this Civilization seem to have been a purely indigenous decay. Mr. Wilson, in his very interesting work on "Prehistoric Man," gives an account of the process by which barbarism has been actually seen extending among the Red Indian tribes. When the valley of the St. Lawrence first came under the observation of Europeans, some of those tribes were found to be leading a settled life, practising agriculture, and constituting communities in possession of all the elements of a Civilization fairly begun, or probably long inherited. The destruction of these communities was effected by the savage hostility of one or two particular tribes, such as the Iriquois and the Mohawks. In these tribes the lust of blood had been developed into an absorbing passion, so that their very name became a terror and a scourge. Wholly given up to war as a pursuit, their path was red with blood and the more peaceful and civilized branches of the same stock were driven, a scanty remnant, into forests and marshes, where their condition was necessarily reduced to that of Savages, living wholly by the chase. It is a curious and instructive fact that this sequence of events was so vividly and painfully remembered among some of the Red Indian tribes that it had become embodied in a religious myth. It was said that in old times the Indians were increasing so fast that they were threatened with want, and that the Great Spirit then taught them to make war, and thus to thin one another's numbers.* Although this myth stands in very close connection with the universal tradition of a Golden Age, or of a Past in some measure better than the Present, it is remarkable on account of the specific cause which he assigns for deterioration and decay, a cause in respect to which we have historical evidence of its actual effects.

When the great French navigator, Cartier, first explored the

* "Fossil Men," Principal Dawson, p. 47. Montreal, 1880.

St. Lawrence in 1534–35, he ascended to that poin of its course whence the City of Montreal now looks down upon its vast and splendid prospect of fertile lands and of rushing waters. He found it occupied by the Indian town of Hochelaga—inhabited by a comparatively civilized people, busy not only in fishing or in hunting, but also in a successful husbandry. The town was strongly fortified, and it was surrounded by cultivated ground. Within one hundred and seven years—some time between 1535 and 1642—Hochelaga had utterly disappeared, with all its population, and all its culture. It had been destroyed by wars, and its site had returned to forest or to bush. To this day when men dig the foundations of new houses in Montreal they dig up the flint implements of the Hochelagans, which, although about 350 years old, may now be reckoned by the scientific anthropologist as relics of the "Stone Age," * and of an ancient universal savagery. The same course of things prevailed over the greater part of Canada. During the first half of the seventeenth century a large part of the valley of the St. Lawrence, and vast tracts of country on both shores of the great Lakes, are known to have been devastated by exterminating wars. In 1626 a Jesuit missionary penetrated into the settlement of a tribe called the Attiwenderonks. He found them inhabiting towns and villages, and largely cultivating Tobacco, Maize, and Beans. The country inhabited by the tribe which has left its name in Lake Erie, is stated to have been greatly more extensive, and is everywhere covered with the marks of a similar stage of civilization. Within less than thirty years later another missionary found the whole of the regions a silent desert. In like manner the country round Lake Huron was, at the same period of time, seen to be full of populous villages defended by walls, and surrounded by cultivated fields. But the same fate befel them.† They were extirpated by the Mohawks.

Here then we see in actual operaion, within very recent times, a true cause—which is quite capable of producing the effects which, by some means or another, have certainly been produced—and that, too, on the largest scale—upon the American Continent. It is a cause arising out of the corrup-

* "Fossil Men," Principal Dawson, pp. 29-42. Montreal, 1880.
† "Prehistoric Man," Dan. Wilson, pp. 359-60.

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tion of human nature, that is to say, out of one of the universal instincts of Mankind, developed in such excess as to become a destructive mania. Many nations most highly civilized have been extremely warlike—and the ambition they have cherished of subduing other nations has been the means of extending over the world their own knowledge of the arts of government, and their own high attainments in the science of jurisprudence. But when the same passion takes possession of ruder men, and is directed by irrational antipathies between rival families and rival tribes, it may be, and has often been, one of the most desolating scourges of humanity. In itself an abuse and a degradation which none of the lower animals exhibit, it tends always to the evolution of further evils, to the complete destruction of civilized communities, or to the reduction of their scanty remnants to the condition and the habits of savage life.

It results from these facts and considerations, gathered over a wide field of observation and experience, that the processes of Evolution and Development as they work in Man, lead to consequences wholly different from those to which they lead in other departments of Creation. There, they tend always in one of two directions, both of which are directions predetermined and in perfect harmony with the Unity of Nature. One of these directions is that of perfect success, the other of these directions is that of speedy extinction. Among the lower animals, when a new Form appears, it suits exactly its surrounding conditions; and when it ceases to do so it ceases to survive. Or if it does survive it lives by change, by giving birth to something new, and by ceasing to be identical with its former self. So far as we can actually see the past work of Development among the beasts, it is a work which has always led either to rapid multiplication or to rapid extinction. There is no alternative. But in Man the processes of Evolution lead in a great variety of directions—some of them tending more or less directly to the elevation of the creature, but others of them tending very speedily and very powerfully to its degradation. In some men they have led to an intellectual and moral standing, of which we can conceive it to be true that it is only a "little lower than the Angels." In others they have ended in

a condition of which it is too evidently true that it is a great deal lower than the condition of the Beasts.

We can get, however, a great deal nearer towards the understanding of this anomaly than the mere recognition of it as a fact. Hitherto we have been dealing only with one of the two great causes of change—namely, that of unfavorable external or physical conditions. Let us now look at the other—namely, the internal nature and character of Man. We can see how it is that, when working under certain conditions, the peculiar powers of Man must lead to endless developments in a wrong direction. Foremost among these powers is the gift of Reason. I speak here of Reason not as the word is often used, to express a great variety of powers, but as applied to the logical Faculty alone. In this restricted sense, the gift of Reason is nothing more than the gift of seeing the necessity or the natural consequences of things—whether these be things said or things done. It is the Faculty by which, consciously or unconsciously, we go through the mental process expressed in the word "therefore." It is the Faculty which confers on us a true gift of Prophecy—the power of foreseeing that which "must shortly come to pass." In its practical application to conduct, and to the affairs of life, it is the gift by which we see the means which will secure for us certain ends, whether these ends be the getting of that which we desire, or the avoiding of that which we dread. But in its root, and in its essence, as well as in its application to the abstract reasoning of mathematics, it it simply the faculty by which we see one proposition as involving, or as following from another.

The power of such a Faculty obviously must be, as it actually is, immeasurable and inexhaustible, because there is no limit to this kind of following. That is to say, there is no end to the number of things which are the consequence of each other. Whatever happens in the world is the result of causes, moral or material, which have gone before, and this result again becomes the cause of other consequences, moral or material, which must follow in their turn. It is a necessary result of the Unity of Nature, and of the Continuity of things, that the links of consequence are the links of an endless chain. It is the business of Reason to see these links as they come one by one gradually

into view; and it is in the nature of a reasoning creature to be drawn along by them in the line, whatever it may be, which is the line of their direction. The distance which may be traversed in following that direction even for a short time, and by a single mind, is often very great—so great that a man may be, and often is, a different Being from himself, both in opinions and in conduct, at two different epochs of his life. There are, indeed, individuals, and there are times and conditions of society, in which thought is comparatively stagnant, when it travels nowhere, or when its movements are so slow and gradual as to be imperceptible. But, on the other hand, there are times when Mind is on the march. And then it travels fast and far. The journey is immense indeed, which may be accomplished by a few successive generations of men following, one after the other, the links of consequence. At the end of such a journey, the children may be separated from their fathers by more than the breadth of Oceans. They may have passed into new regions of thought and of opinion, of habit and of worship. If the movement has been slow, and if the time occupied has been long, it will be all the more difficult to retrace the steps by which the change has been brought about. It will appear more absolute and complete than it really is—the new regions of thought being in truth connected with the old by a well-beaten and continuous track.

But these endless processes of Development arising out of the operation of the Reasoning Faculty, are consistent with any result—good or bad. Whether the great changes they produce have been for the better or for the worse, must depend, not on the length of the journey, but on the original direction in which it was begun. It depends on whether that direction has been right or wrong—on whether the road taken has been the logical development of a truth, or the logical development of a lie. The one has a train of consequences as long and as endless as the other. It is the nature of the Reasoning Faculty that it works from data. But these data are supplied to it from many different sources. In the processes of reasoning on which the abstract sciences depend, the fundamental data are axioms or self-evident propositions. These may, in a sense, be said to be supplied by the Reasoning Faculty itself, because the recogni-

tion of a truth as self-evident is in itself an exercise of the Reasoning Faculty. But in all branches of knowledge, other than the abstract sciences, that is to say, in every department of thought which most nearly concerns our conduct and our beliefs, the data on which Reason has to work are supplied to it from sources external to itself. In matters of Belief, they come, for the most part, from Authority, in some one or other of its many forms, or from Imagination working according to its own laws upon impressions received from the external world. In matters of conduct, the data supplied to Reason come from all the innumerable motives which are founded on the desires. But in all these different provinces of thought it is the tendency and the work of Reason to follow the proposition, or the belief, or the motive, to all its consequences. Unless, therefore, the proposition is really as true as it seems to be; unless the belief is really according to the fact; unless the motive is really legitimate and good, it is the necessary effect of the logical Faculty to carry men farther and farther into the paths of error, until it lands them in depths of degradation and corruption of which unreasoning creatures are incapable.

It is astonishing how reasonable—that is to say, how logical—are even the most revolting practices connected, for example, with religious worship or religious customs, provided we accept as true some fundamental conception of which they are the natural result. If it be true that the God we worship is a Being who delights in suffering, and takes pleasure, as it were, in the very smell of blood, then it is not irrational to appease Him with hecatombs of human victims. This is an extreme case. There are, however, such cases, as we know, actually existing in the world. But, short of this, the same principle is illustrated in innumerable cases, where cruel and apparently irrational customs are in reality nothing but the logical consequences of some fundamental Belief respecting the nature, the character, and the commands of God. In like manner, in the region of morals and of conduct not directly connected with religous Beliefs, Reason may be nothing but the servant of Desire, and in this service may have no other work to do than that of devising means to the most wicked ends. If the doctrine given to Reason be the doctrine that pleasure and self-indulgence, at

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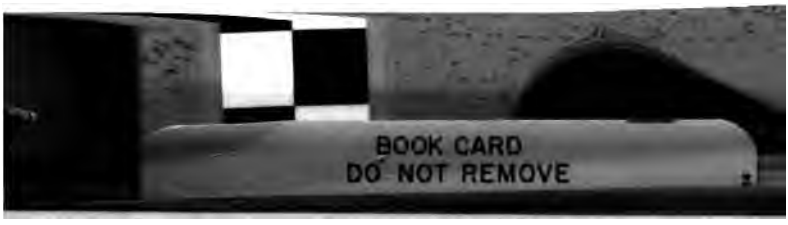
whatever sacrifice to others, are the great aims and ends of life, then Reason will be busy in seeking out "many inventions" for the attainment of them, each invention being more advanced than another in its defiance of all Obligation and in its abandonment of all sense of duty. Thus the development of selfishness under the guidance of faculties which place at its command the great powers of foresight and contrivance, is a kind of development quite as natural and quite as common as that which constitutes the growth of knowledge and of virtue. It is indeed a development which, under the condition supposed—that is to say, the condition of false or erroneous data supplied to the Reasoning Faculty—is not an accident or a contingency, but a necessary and inevitable result.

And here there is one very curious circumstance to be observed, which brings us still closer to the real seat of the anomaly which makes Man in so many ways the one great exception to the Order of Nature. That circumstance is the helplessness of mere Reason to correct the kind of error which is most powful in vitiating conduct. In those processes of abstract Reason which are the great instruments of work in the exact sciences, the Reasoning Faculty has the power of very soon detecting any element of error in the data from which it starts. That any given proposition leads to an absurd result, is one of the familiar methods of disproof in mathematics. That one of only two possible alternatives is proved to be absurd, is conclusive demonstration that the other must be true. In this way Reason corrects her own operations, for the Faculty which recognizes one proposition as evidently absurd, is the same Faculty which recognizes another proposition as evidently true. It is, indeed, because of its contradicting something evidently true, or something which has been already proved to be true, that the absurd result is seen to be absurd. It is in this way that, in the exact sciences, erroneous data are being perpetually detected, and the sources of error are being perpetually eliminated. But Reason seems to have no similar power of detecting errors in the data which are supplied to it from other departments of thought. In the developments, for example, of social habits, and of the moral sentiments on which these principally depend, no results, however extravagant or revolting, are at all certain

of being rejected because of their absurdity. Among men we see it to be a fact that no practice however cruel, no custom however destructive, is sure on account of its cruelty or of its destructiveness to be at once detected and rejected as self-evidently wrong. Reason works upon the data supplied to it by superstition, or by selfish passions and desires, apparently without any power of questioning the validity of those data, or, at all events, without any power of immediately recognizing even their most extreme results as evidently false. In Religion, at least, it would almost seem as if there were no axiomatic truths which are universally, constantly, and instinctively present to the Mind—none, at least, which are incapable of being obscured—and which, therefore, enevitably compel it to revolt against every course or every belief inconsistent with them. It is through this agency of erroneous Belief that the very highest of our faculties, the Sense of Obligation, may and does become itself the most powerful of all agents in the development of evil. It consecrates what is worst in our own nature, or whatever of bad has come to be sown in the multitudinous elements which that nature contains. The consequence is, that the gift of Reason is the very gift by means of which error in Belief, and vice in Character, are carried from one stage of development to another, until at last they may, and they often do, result in conditions of life and conduct removed by an immeasurable distance from those which are in accordance with the order and with the analogies of Nature.

These are the conditions of life, very much lower, as we have seen, than those which prevail among the Brutes, which it is now the fashion to assume to be the nearest type of the conditions from which the Human Race began its course. They are, in reality and on the contrary, conditions which could not possibly have been reached except after a very long journey. They are the goal at which men have arrived after running for many generations in a wrong direction. They are the result of Evolution—they are the product of Development. But it is the evolution of germs whose growth is noxious. It is the development of passions and desires, some of which Man possesses in common with the Brutes, others of which are peculiar to himself, but all of which are in him freed from the guiding limita-



tions which in every other department of Nature prevail among the motive forces of the world, and by means of which alone they work to order.

It is in the absence of these limitations that what is called the Free Will of Man consists. It is not a freedom which is absolute and unconditional. It is not a freedom which is without limitations of its own. It is not a freedom which confers on Man the power of acting except on some one or other of the motives which it is in his nature to entertain. But that nature is so infinitely complex, so many-sided, is open to so many influences, and is capable of so many movements, that practically their combinations are almost infinite. His freedom is a freedom to choose among these motives, and to choose what he knows to be the worse instead of the better part. This is the freedom without which there could be no action attaining to the rank of Virtue; and this also is the freedom in the wrong exercise of which all Vice consists.

There is no theoretical necessity that along with this freedom there should be a propensity to use it wrongly. It is perfectly conceivable that such freedom should exist, and that all the desires and dispositions of men should be to use it rightly. Not only is this conceivable, but it is a wonder that it should be otherwise. That a Being with powers of Mind and capacities of enjoyment rising high above those which belong to any other creature, should, alone of all these creatures, have an innate tendency to use his powers, not only to his own detriment, but even to his own self-torture and destruction, is such an exception to all rule, such a departure from all Order, and such a violation of all the Reasonableness of Nature, that we cannot think too much of the mystery it involves. It is possible that some light may be thrown upon this mystery by following the facts connected with it into one of the principal fields of their display—namely, the History of Religion. But this must form the subject of another chapter.

CHAPTER XI.

ON THE NATURE AND ORIGIN OF RELIGION.

If any one were to ask what is the origin of hunger or what is the origin of thirst, the idleness of the question would be felt at once. And yet hunger and thirst have had an origin. But that origin cannot be separated from the origin of Organic Life, and the absurdity of the question lies in this—that in asking it, the possibility of making such a separation is assumed. It involves either the supposition that there have been living creatures which had no need of food and drink, or else the supposition that there have been living creatures which, having that need, were nevertheless destitute of any corresponding appetite. Both of these suppositions, although not in the abstract inconceivable, are so contrary to all that we know of the laws of Nature, that practically they are rejected as impossible. There always is, and there always must be, a close correspondence between the intimations of Sensibility and the necessities of Life. Hunger is the witness in sensation to the law which demands for all living things a renewal of Force from the assimilation of external matter. To theorize about its origin is to theorize about the origin of that law, and consequently about the origin of embodied Life. The Darwinian formula is not applicable here. Appetite cannot have arisen out of the accidents of variation. It must have been coeval with Organization, of which it is a necessary part. The same principle applies to all elementary appetites and affections, whether they be the lower appetites of the Body or the higher appetites of the Mind. They exist because of the co-existence of certain facts and of certain laws to which they stand in a relation which is natural and necessary, because it is a relation which is reasonable and fitting. Really to understand how these appetites and affections arose, it would be necessary to understand how all the corresponding facts and laws came to be. But in many

cases—indeed in most cases—any such understanding is impossible, because the facts and the laws to which every appetite corresponds are in their very nature ultimate. They are laws behind which, or beyond which, we cannot get. The only true explanation of the appetite lies in the simple recognition of the Adjusted Relations of which it forms a part; that is to say—in a recognition of the whole System of Nature as a Reasonable System, and of this particular part of it as in harmony with the rest. Any attempted explanation of it which does not start with that recognition of the Reasonableness of Nature must be futile. Any explanation which not only fails in this recognition, but assumes that the origin of anything can be interpreted without it, must be not only futile but erroneous.

Men have been very busy of late in speculating on the origin of Religion. In asking this question they generally make, often as it seems unconsciously, one or other of two assumptions. One is the assumption that there is no God, and that it must have taken a long time to invent Him. The other is that there is a God, but that men were born, or created, or developed, without any sense or feeling of His existence, and that the acquisition of such a sense must of necessity have been the work of time.

I do not now say that either of these assumptions is in itself inconceivable, any more than the supposition that at some former time there were creatures needing food and drink and yet having no appetites to inform them of the fact. But what I desire to point out is, first, that one or other of these assumptions is necessarily involved in most speculations on the subject; and secondly, that, to say the least, it is possible that neither of these assumptions may be true. Yet the method of inquiry to be pursued respecting the origin of Religion must be entirely different, according as we start from one or other of these assumptions, or as we reject them both. If we assume that there is no God, then the question how Mankind have come so widely to invent one or more of such imaginary Beings, is indeed a question well worthy of our utmost curiosity and research. But on the other hand, if we start with the assumption that there is a God, or indeed if we assume no more than that there are Intelligences in the Universe superior to

Man, and possessing some power greater than his own over the Natural System in which he lives, then the method of inquiry into the origin of Religion is immensely simplified. Obviously the question how Man first came to recognize the existence of his Creator, if we suppose such a Being to exist, becomes in virtue of that supposition relegated to the same class as the question how he first came to recognize any other of the facts or truths which it concerns him most to know. Indeed from its very nature this truth is evidently one which might be more easily and more directly made known to him than many others. The existence of a Being from whom our own Being has been derived involves, at least, the possibility of some communication direct or indirect. Yet the impossibility or the improbability of any such communication is another of the assumptions continually involved in current theories about the origin of Religion. Yet it is quite certain that no such assumption can be reasonably made. The perceptions of the Human Mind are accessible to the intimations of external truth through many avenues of approach. In its very structure it is made to be responsive to some of these intimations by immediate apprehension. Man has that within him by which the Invisible can be seen, and the Inaudible can be heard, and the Intangible can be felt. Not as the result of any reasoning, but by the same power by which it sees and feels the postulates on which all reasoning rests, the Human Mind may from the very first have felt that it was in contact with a Mind which was the fountain of its own.

No argument can be conducted without some assumptions. But neither ought any argument to be conducted without a clear understanding what these assumptions are. Having now cleared up the assumptions which are usually made, we can proceed with greater confidence in the discussion of the great problem before us. The origin of particular systems of religious Belief is, of course, a mere question of fact. A few of these systems belong to our own time: others have arisen late in the Historic Ages and in the full light of contemporary evidence. Some, again, are first recognized in the dawn of those Ages, and their distinctive features can only be dimly traced through evidence which is scanty and obscure. Religion is

the origin of all these systems of Belief, but no one of them represents the origin of Religion. None of them throw any other light on the origin of Religion than as all exhibiting the one essential element in which all Religion consists. And it would be well if men, before philosophizing on the origin of Religion, had a more accurate conception of what they mean by it. The definitions of Religion have been even worse than the definitions of Morality. Just as the attempt is made to account for Morals apart from the sense of duty or of Obligation in conduct, so is the attempt made to account for Religion apart from the sense of Mind or Will in Nature. The great effort seems to have been to try how the essential idea of Religion could be either most completely eliminated or else most effectually concealed. For example, a feeling of absolute Dependence has been specified by Schleiermacher as the essence of Religion. Yet it is evident that a sense of absolute Dependence may be urgent and oppressive without the slightest tincture of religious feeling. A man carried off in a flood, and clinging to a log of wood, may have, and must have, a painful sense of absolute dependence on the log. But no one would think of describing this sense as a feeling of Religion. A Savage may have a feeling of absolute dependence on his bows and arrows, or on the other implements of his chase; or disease may bring home to him a sense of his absolute dependence on the Organs of his own body, which alone enable him to use his weapons with success. But it does not follow that the Savage has any feeling of Religion towards his bow, or his arrow, or his net, or his fish-spear, or even towards his own legs and arms. Any plausibility, therefore, which may attach to the proposition which identifies Religion with the mere sense of Dependence, is due entirely to the fact that when men speak of a sense of Dependence they suggest the idea of a particular kind of dependence—namely, Dependence upon a Being or a Personality, and not Dependence upon a thing. That is to say, that the plausibility of the definition is entirely due to an element of thought which it is specially framed to keep out of sight. A sense of absolute Dependence on purely physical things does not necessarily contain any religious element whatever. But on the other hand, a sense of

Dependence on Personal or Living Agencies, whether they are supposed to be supreme or only superior to our own, is a feeling which is essentially religious.* But the element in that feeling which makes it religious is the element of belief in a Being or in Beings who have Power and Will. When we say of any man, or of any tribe of men, that they have no Religion, we mean that they have no belief in the existence of any such Being or Beings, or at least no such belief as to require any acknowledgment or any worship.

The practice of worship of some kind or another is so generally associated with Religion, that we do not usually think of it otherwise than as a necessary accompaniment. It is a natural accompaniment, for the simple reason that in the very act of thinking of Superhuman Beings the Mind has an inevitable tendency to think of them as possessing not only an intellectual but a moral nature which has analogies with our own. It conceives of them as having dispositions and feelings as well as mere Intellect and Will. Complete indifference towards other creatures is not natural or usual in ourselves, nor can it be natural to attribute it to other Beings. In proportion therefore as we ascribe to the Superhuman Personalities, in whose existence we believe, the Authorship or the rule over, or even a mere partnership in, the activities round us, in the same proportion is it natural to regard those Beings as capable of exercising some influence upon us, whether for evil or for good. This conception of them must lead to worship—that is to say, to the cherishing of some feeling and sentiment in regard to them, and to some methods of giving it expression. There is, therefore, no mystery whatever in the usual and all but universal association of worship of some kind with all conceptions of a religious nature.

It is to be remembered, however, that as a matter of fact, the belief in the existence of a God, or of more Gods than one, has come, though rarely, to be separated from the worship of them. Among speculative philosophers this separation may arise from theories about the Divine nature, which represent it as inaccessible to supplication, or as indifferent to the sentiments of men.

* Professor Tiele's definition of Religion corresponds with that here given :—"The relation between Man and the Superhuman Powers in which he believes." (Outlines of the History of the Ancient Religions, p. 2.)

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Among Savages it may arise from the evolution of decay. It may be nothing but "a sleep and a forgetting"—the result of the breaking up of ancient homes, and the consequent impossibility of continuing the practice of rites which had become inseparably associated with local usages. Among philosophers this divorce between the one essential element of Religion and the natural accompaniments of worship, is well exhibited in the Lucretian conception of the Olympian Gods, as well as in the condition of mind of many men in our own day, who have not rejected the idea of a God, but who do not feel the need of addressing Him in the language either of prayer or praise. Of this same divorce among Savages we have an example in certain Australian tribes, who are said to have a theology so definite as to believe in the existence of one God, the omnipotent Creator of Heaven and of Earth, and yet to be absolutely destitute of any worship.* Both of these, however, are aberrant phenomena—conditions of mind which are anomalous, and in all probability essentially transitional. It has been shown in the preceding pages how impossible it is to regard Australian or any other Savages of the present time as representing the probable condition of Primeval Man. It needs no argument to prove that it is equally impossible to regard speculative philosophers of any school as representing the mind of the earliest progenitors of our race. But neither of Savages nor of Philosophers who believe in a God but do not pray to Him, would it be proper to say that they haveno Religion. They may be on the way to having none, or they may be on the way to having more. But men who believe in the existence of any Personal or Living Agency in Nature superior to our own, are in possession of the one essential element of all Religion. This belief is almost universally associated with practices which are in the nature of worship—with sentiments of awe, or of reverence, or of fear.

It is not inconsistent with this definition to admit that sects or individuals, who have come to reject all definite theological conceptions and to deny the existence of a living God, have, nevertheless, been able to retain feelings and sentiments which may justly claim to be called religious. In the first place, with

*Hibbert Lectures, by Max Müller, 1878, pp. 16, 17.

many men of this kind, their denial of a God is not in reality a complete denial. What they deny is very often only some particular conception of the Godhead, which is involved, or which they think is involved, in the popular theology. They are repelled, perhaps, by the familiarity with which the least elevated of human passions are sometimes attributed to the Divine Being. Or they may be puzzled by the anomalies of Nature, and find it impossible to reconcile them intellectually with any definite conception of a Being who is both all-powerful and all-good. But in faltering under this difficulty, or under other difficulties of the same kind, and denying the possibility of forming any clear or definite conceptions of the Godhead, they do not necessarily renounce other conceptions which, though vague and indefinite, are nevertheless sufficient to form the nucleus of a hazy atmosphere of religious feeling and emotion. Such men may or may not recognize the fact that these feelings and emotions have been inherited from ancestors whose beliefs were purely theological, and that it is in the highest degree doubtful how long these feelings can be retained as mere survivals.

It is remarkable that such feelings are even now artificially propped up and supported by a system of investing abstract terms with all the elements of Personality. When men who profess to have rejected the idea of a God declare, nevertheless, as Strauss has declared, that "the world is to them the workshop of the Rational and the Good,"—when they explain that "that on which they feel themselves to be absolutely dependent is by no means a brute power, but that it is Order and Law, Reason and Goodness, to which they surrender themselves with loving confidence," we cannot be mistaken that the whole of this language, and the whole conceptions which underlie it, are language and conceptions appropriate to Agencies and Powers which are possessed of all the characteristics of Mind and Will. Order and Law are, indeed, in some minds associated with nothing except Matter and material Forces. But neither Reason nor Goodness can be thus dissociated from the idea of Personality. All other definitions which have been given of Religion will be found on analysis to borrow whatever strength they have from involving, either expressly or implicitly, this one conception. Morality, for example, becomes Religion in

proportion as all duty and all Obligation is regarded as resting on the sanctions of a Divine Authority. In like manner, Knowledge may be identified with Religion in proportion as all knowledge is summed up and comprehended in the perfect knowledge of One who is All in All. Nor is there any real escape from this one primary and fundamental element of Religion in the attempt made by Comte to set up Man himself—Humanity—as the object of religious worship. It is the Human Mind and Will abstracted and personified that is the object of this worship. Accordingly, in the system of Comte, it is the language of Christian and even of Catholic adoration that is borrowed as the best and fullest expression of its aspirations and desires. Such an impersonation of the Human Mind and Will, considered as an aggregate of the past and of the future, and separated from the individual who is required to worship it, does contain the element, or at least some faint outline and shadow of the one element, which has been here represented as essential to Religion—the element, namely, of some Power in Nature other than mere brute Matter or mere physical Force—which Power is thought of and conceived as invested with the higher attributes of the Human Personality.

Like methods of analysis are sufficient to detect the same element in other definitions of Religion, which are much more common. When, for example, it is said that "the Supernatural" or "the Infinite" are the objects of religious thought, the same fundamental conception is involved, and is more or less consciously intended. The first of these two abstract expressions, "the Supernatural," is avowedly an expression for the existence and the agency of superhuman Personalities. It is objectionable only in so far as it seems to imply that such agency is no part of "Nature." This is in one sense a mere question of definition. We may choose to look upon our own human agency as an agency which is outside of Nature. If we do so, then, of course, it is natural to think of the agency of other Beings as outside of Nature also. But, on the other hand, if we choose to understand by "Nature" the whole System of things, visible and invisible, in which we live and of which we form a part, then the belief in the agency of other Beings of greater power, does not necessarily involve any belief whatever

that they are outside of that System. On the contrary, the belief in such an agency may be identified with all our conceptions of what that System as a whole is, and especially of its Order and its Intelligibility. Whilst therefore, "the Supernatural," as commonly understood, gives a true indication of the only real objects of religious thought, it complicates that indication by coupling the idea of Living Agencies above our own with a description of them which at the best is irrelevant, and is very apt to be misleading. The question of the existence of Living Beings superior to Man, and having more or less power over him and over his destinies, is quite a separate question from the relation in which those Beings may stand to what is commonly but variously understood by "Nature."

The other phrase, now often used to express the objects of religious thought and feeling, "the Infinite," is a phrase open to objection of a very different kind. It is ambiguous, not merely as "the Supernatural" is ambiguous, by reason of its involving a separate and adventitious meaning besides the meaning which is prominent and essential; but it is ambiguous by reason of not necessarily containing at all the one meaning which is essential to Religion. "The Infinite" is a pure and bare abstraction, which may or may not include the one only object of religious consciousness and thought. An Infinite Being, if that be the meaning of "the Infinite," is, indeed, the highest and most perfect object of Religion. But an infinite space is no object of religious feeling. An infinite number of material units is no object of religious thought. Infinite time is no object of religious thought. On the other hand, infinite Power not only may be, but must be, an object of religious contemplation in proportion as it is connected with the idea of Power in a living Will. Infinite Goodness must be the object of religious thought and emotion, because in its very nature this conception involves that of a Personal Being. But if all this is what is intended by "the Infinite," then it would be best to say so plainly. The only use of the phrase, as the one selected to indicate the object of Religion, is that it may be understood in a sense that is kept out of sight. And the explanations which have been given of it are generally open to the same charge of studied ambiguity. "The Infinite" has been

defined as that which transcends Sense and Reason,—that which cannot be comprehended or completely and wholly understood, although it may be apprehended or partially conceived.* And no doubt, if this definition be applied, as by implication it always is applied, to the Power and to the resources, or to any other feature in the character of an Infinite Being, then it becomes a fair definition of the highest conceivable object of religious thought. But, again, if it be not so applied,—if it be understood as only applying to the impossibility under which we find ourselves of grasping anything which is limitless,—of counting an infinite number of units,—of traversing, even in thought, an infinite space,—of living out an infinite time,—then "the Infinite" does not contain, even in the least degree, the one essential element which constitutes Religion.

Similar objections apply to another abstract phrase, sometimes used as a definition of the object of religious feeling, namely, "the Invisible." Mere material things, which are either too large to be wholly seen, or too small to be seen at all, can never supply the one indispensable element of Religion. In so far, therefore, as Invisibility applies to them only, it suggests nothing of a religious nature. But in so far as "the Invisible" means, and is intended to apply to, living Beings who are out of sight, to Personal Agencies which either have no bodily form, or who are thought of and conceived as separate from such form—in so far, of course, the "Invisible," like the Infinite, does cover and include the conception without which there can be no Religion.

Definitions of meaning are more or less important in all discussions; but there are many questions in which they are by no means essential, because of the facility with which we refer the abstract words we may be using to the concrete things,—to the actual phenomena to which they are applied. When, for example, we speak of the religion of Mahomet, or of the religion of Confucius, or of the religion of Buddha, we do not need to define what we mean by the word "Religion," because in all of these cases the system of doctrine and the conceptions which constitute those religions are known, or are matters of historical evidence. But when we come to discuss the origin,

* Max Müller, Hibbert Lectures, 1878.

not of any particular system of Belief, but of Religion in the abstract, some clear and intelligible definition of the word Religion becomes absolutely essential, because in that discussion we are dealing with a question which is purely speculative. It is idle to enter upon that speculative discussion unless we have some definite understanding what we are speculating about. In the case of Religion we cannot keep our understanding of the word fresh and distinct by thinking of any well-known and admitted facts respecting the beginnings of Belief. There are no such facts to go upon as regards the religion of Primeval Man. Those, indeed, who accept the narrative attributed to the inspired authority of the Jewish Lawgiver have no need to speculate. In that narrative the origin of Religion is identified with the origin of Man, and the Creator is represented as having had, in some form or another, direct communication with the Creature He had made. But those who do not accept that narrative, or who, without rejecting it altogether, regard it as so full of metaphor that it gives us no satisfying explanation, and who assumes that Religion has had an origin subsequent to the origin of the Species, have absolutely nothing to rely upon in the nature of History. There is no contemporary evidence, nor is there any tradition which can be trusted. Primeval Man has kept no journal of his own first religious emotions, any more than of his own first appearance in the world. We are therefore thrown back upon pure speculation—speculation, indeed, which may find in the present, and in a comparatively recent past, some data for arriving at conclusions, more or less probable, on the conditions of a time which is out of sight. But among the very first of these data, if it be not indeed the one datum without which all others are useless, is a clear conception of the element which is common to all Religions as they exist now, or as they can be traced back beyond the dawn of History into the dim twilight of Tradition. Of this universal element in all religions "the Infinite" is no definition at all. It is itself much more vague and indefinite in meaning than the word which it professes to explain. And this is all the more needless, seeing that the common element in all Religions, such as we know them now, is one of the greatest simplicity. It

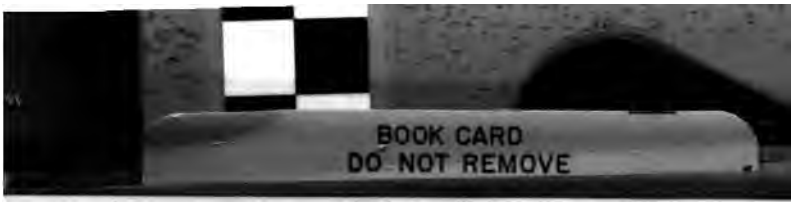
is the element of a Belief in superhuman Beings—in living Agencies, other and higher than our own.

It is astonishing how much the path of investigation is cleared before us the moment we have arrived at this definition of the Belief which is fundamental to all Religions. That Belief is simply a Belief in the existence of Beings of whom our own Being is the type, although it need not be the Measure or the Form. By the very terms of the definition the origin of this Belief is and must be in ourselves—in our own conscious relationship to external facts. That is to say, the disposition to believe in the existence of such Beings arises out of the felt Unity of our own nature with the whole System of things in which we live and of which we are a part. It is the simplest and most natural of all conceptions, that the Agency of which we are most conscious in ourselves is like the Agency which works in the world around us. Even supposing this conception to be groundless, and that, as some now maintain, a more scientific investigation of natural agencies abolishes the conception of Design or Purpose, or of personal Will being at all concerned therein,—even supposing this, it is not the less true that the transfer of conceptions founded on our own consciousness of Agency and of Power within us to the Agencies and Powers around us, is a natural, if it be not indeed a necessary, conception. That it is a natural conception is proved by the fact that it has been, and still is, so widely prevalent; as well as by the fact that what is called the purely scientific conception of Natural Agencies is a modern conception, and one which is confessedly of difficult attainment. So difficult indeed is it to expel from the mind the conception of Personality in or behind the Agencies of Nature, that it may fairly be questioned whether it has ever been effectually done. Verbal devices for keeping the idea out of sight are indeed very common; but even these are not very successful. I have elsewhere pointed out* that those naturalists and philosophers who are most opposed to all theological explanations or conceptions of natural Forces do, nevertheless, habitually, in spite of themselves, have recourse to language which derives its whole form, as well as its whole intelligibility, from those elements of meaning which

* "Reign of Law," chaps. i. and v.

refer to the familiar operations of our own Mind and Will. The very phrase "Natural Selection" is one which likens the operations of Nature to the operations of a Mind exercising the power of Choice. The whole meaning of the phrase is to indicate how Nature attains certain ends which are like "Selection." And what "Selection" is we know, because it is an operation familiar to ourselves. But the personal element of Will and of Purpose lies even deeper than this in the scientific theory of Evolution. When we ourselves select, we may very often choose only among things ready made to our hands. But in the theory of Evolution, Nature is not merely represented as choosing among things ready made, but as at first making the things which are to be afterwards fitted for selection. Organs are represented as growing in certain forms and shapes "in order that" they may serve certain uses, and then as being "selected" by that use in order that they may be established and prevail. The same idea runs throughout all the detailed descriptions of growth and of development by which these processes are directed to useful and serviceable results. So long as in the mere description of phenomena men find themselves compelled to have recourse to language of this sort, they have not emancipated themselves from the natural tendency of all human thought to see the elements of our own Personality in the energies and in the works of Nature.

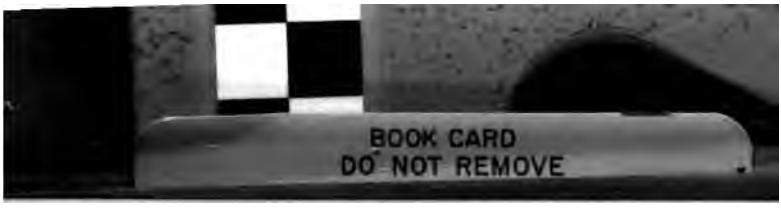
But whether the attempt at such emancipation be successful or not, the very effort which it requires is a proof of the natural servitude under which we lie. And if it be indeed a natural servitude, the difficulty of getting rid of it is explained. It is hard to kick against the pricks. There is no successful rebellion against the Servitudes of Nature. The suggestions which come to us from the external world, and which are of such necessity that we cannot choose but hear them, have their origin in the whole constitution and course of things. To seek for any origin of them apart from the origin of our whole intellectual nature, and apart from the relations between that nature and the facts of the Universe around us, is to seek for something which does not exist. We may choose to assume that there are no Intelligences in Nature superior to our own; but the fact remains that it is a part of our mental constitution to imag-



ine otherwise. If, on the other hand, we assume that such Intelligences do exist, then the recognition of that existence, or the impression of it, is involved in no other difficulty than is involved in the origin of any other part of the furniture of our minds. What is the origin of Reason? The perception of Logical Necessity is the perception of a real relation between things; and this relation between things is represented by a corresponding relation between our conceptions of them. We can give no account of the origin of that perception unless we can give an account of the origin of Man, and of the whole system to which he stands related. What, again, is the origin of Imagination? It is the mental power by which we handle the elementary conceptions derived from our mental constitution in contact and in harmony with external things, and by which we recombine these conceptions in an endless variety of forms. We can give no account of the origin of such a power or of such a habit. What is the origin of Wonder? In the lower animals a lower form of it exists in the shape of Curiosity, being little more than an impulse to seek for that which may be food, or to avoid that which may be danger. But in Man it is one of the most powerful and the most fruitful of all his mental characteristics. Of its origin we can give no other account than that there exists in Man an indefinite power of knowing, in contact with an equally indefinite number of things which are to him unknown. Between these two facts the connecting link is the wish to know. And, indeed, if the System of Nature were not a Reasonable System, the power of knowing might exist in Man without any wish to use it. But the System of Nature, being what it is—a System which is the very embodiment of Wisdom and Knowledge—such a departure from its Unity is impossible. That Unity consists in the universal and rational correspondence of all its essential facts. There would be no such correspondence between the powers of the human Mind and the ideas which they are fitted to entertain, if these powers were not incited by an appetite of inquiry. Accordingly, the desire of knowledge is as much born with Man as the desire of food. The impression that there are things around him which he does not know or understand, but which he can know and understand by effort and inquiry, is so much part of Man's Na-

ture that Man would not be Man without it. Religion is but a part of this impression—or rather it is the sum and consummation of all the intimations from which this impression is derived. Among the things of which he has an impression as existing, and respecting which he desires to know more, are, above all other things, Personalities or Agencies, or Beings having powers like, but superior to, his own. This is Religion. In this impression is to be found the origin of all Theologies. But of its own origin we can give no account until we know the origin of Man.

I have dwelt upon this point of definition because those who discuss the origin of Religion seem very often to be wholly unconscious of various assumptions which are necessarily involved in the very question they propound. One of these assumptions clearly is that there was a time when Man existed without any feeling or impression that any Being or Beings superior to himself existed in Nature or behind it. The assumption is that the idea of the existence of such Beings is a matter of high and difficult attainment, to be reached only after some long process of evolution and development. Whereas the truth may very well be, and probably is, that there never was a time since Man became possessed of the mental constitution which separates him from the Brutes, when he was destitute of some conception of the existence of living Agencies other than his own. Instead of being a difficult conception, it may very well turn out to be, on investigation, the very simplest of all conceptions. The real difficulty may lie not in entertaining it, but in getting rid of it, or in restraining its undue immanence and power. The reason of this difficulty is obvious. Of all the Intuitive Faculties which are peculiar to Man, that of Self-consciousness is the most prominent. In virtue of that faculty or power, without any deliberate reasoning or logical process of any formal kind, Man must have been always familiar with the idea of energies which are themselves invisible, and only to be seen in their effects. His own loves and hates, his own gratitude and revenge, his own schemes and resolves, must have been familiar to him from the first as things in themselves invisible, and yet having power to determine the most opposite and the most decisive changes for good or evil in things which are visible and mate-

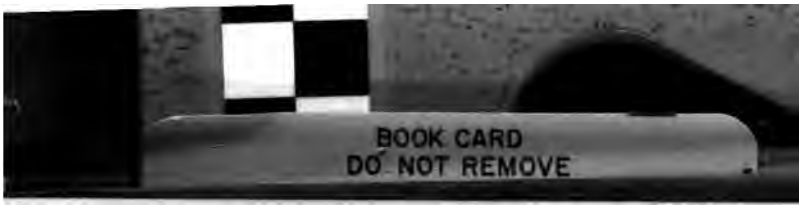


rial. It never could have been difficult for him, therefore, to separate the idea of Personality, or of the efficiency of Mind and Will, from the attribute of visibility. It never could have been any difficulty with him to think of living Agencies other than his own, and yet without any Form, or with Forms concealed from sight. There is no need therefore to hunt farther afield for the origin of this conception than Man's own consciousness of himself. There is no need of going to the winds which are invisible, or to the heavenly bodies which are intangible, or to the sky which is immeasurable. None of these, in virtue either of mere invisibility, or of mere intangibility, or of mere immeasurableness, could have suggested the idea which is fundamental in Religion. That idea was indeed supplied to Man from Nature; but it was from his own nature in communion with the nature of all things around him. To conceive of the energies that are outside of him as like the energies that he feels within him, is simply to think of the unknown in terms of the familiar and the known. To think thus can never have been to him any matter of difficult attainment. It must have been, in the very nature of things, the earliest, the simplest, and the most necessary of all conceptions.

The conclusion, then, to which we come from this analysis of Religion is that there is no reason to believe, but on the contrary many reasons to disbelieve, that there ever was a time when Man, with his existing constitution, lived in contact with the Forces and in face of the Energies of Nature, and yet with no impression or belief that in those energies, or behind them, there were Living Agencies other than his own. And if Man, ever since he became Man, had always some such impression or Belief, then he always had a Religion, and the question of its origin cannot be separated from the origin of the Species.

It is a part of the Unity of Nature that the clear perception of any one truth leads almost always to the perception of some other, which follows from or is connected with the first. And so it is in this case. The same analysis which establishes a necessary connection between the self-consciousness of Man and the one fundamental element of all religious emotion and Belief, establishes an equally natural connection between another part of the same self-consciousness and certain tendencies

in the development of Religion which we know to have been widely prevalent. For although in the operations of our own Mind and Spirit, with their strong and often violent emotions, we are familiar with a powerful Agency which is in itself invisible, yet it is equally true that we are familiar with that Agency as always working in and through a Body. It is natural, therefore, when we think of Living Agencies in Nature other than our own, to think of them as having some Form, or at least as having some Abode. Seeing, however, and knowing the work of those Agencies to be work exhibiting power and resources so much greater than our own, there is obviously unlimited scope for the imagination in conceiving what that Form and where that Abode may be. Given, therefore, these two inevitable tendencies of the human Mind—the tendency to believe in the existence of Personalities other than our own, and the tendency to think of them as living in some Shape and in some Place—we have a natural and sufficient explanation, not only of the existence of Religion, but of the thousand forms in which it has found expression in the world. For as Man since he became Man, in respect to the existing powers and apparatus of his Mind, has never been without the consciousness of Self, nor without some desire of interpreting the things around him in terms of his own thoughts, so neither has he been without the power of imagination. By virtue of it he recombines into countless new forms not only the Images of Sense but his own instinctive interpretations of them. Obviously we have in this faculty the prolific source of an infinite variety of conceptions which may be pure and simple or foul and unnatural, according to the elements supplied out of the moral and intellectual character of the minds which are imagining. Obviously, too, we have in this process an unlimited field for the development of good or of evil germs. The work which in the last chapter I have shown to be the inevitable work of Reason when it starts from any datum which is false, must be, in religious conceptions above all others, a work of rapid and continuous evolution. The steps of Natural Consequence, when they are downward here, must be downwards along the steepest gradients. It must be so because the conceptions which men have formed respecting the Supreme Agencies in Nature are of necessity concep-



tions which give energy to all the springs of Action. They touch the deepest roots of Motive. In Thought they open the most copious fountains of Suggestion. In Conduct they affect the supreme influence of Authority, and the next most powerful of all influences, the influence of Example. Whatever may have been false or wrong, therefore, from the first in any religious conception must inevitably tend to become worse and worse with time, and with the temptation under which men have lain to follow up the steps of evil consequence to their most extreme conclusions.

Armed with the certainties which thus arise out of the very nature of the conceptions we are dealing with when we inquire into the origin of Religion, we can now approach that question by consulting the only other sources of authentic information, which are, first, the facts which Religion presents among the existing generations of men , and, secondly,, such facts as can be safely gathered from the records of the past.

On one main point which has been questioned respecting existing facts, the progress of inquiry seems to have established beyond any reasonable doubt that no race of men now exists so savage and degraded as to be, or to have been when discovered, wholly destitute of any conceptions of a religious nature. It is now well understood that all the cases in which the existence of such savages has been reported, are cases which break down upon more intimate knowledge and more scientific inquiry.

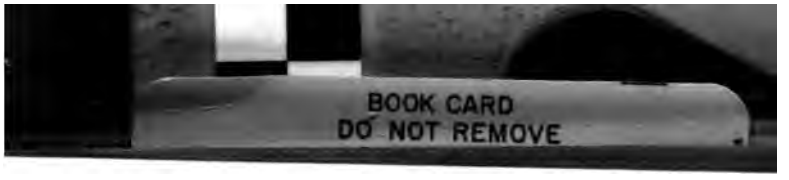
Such is the conclusion arrived at by a careful modern inquirer, Professor Tiele, who says: "The statement that there are nations or tribes which possess no religion, rests either on inaccurate observations or on a confusion of ideas. No tribe or nation has yet been met with destitute of belief in any higher Beings, and travellers who asserted their existence have been afterwards refuted by facts. It is legitimate, therefore, to call Religion, in its most general sense, an universal phenomenon of humanity." *

Although this conclusion on a matter of fact is satisfactory, it must be remembered that, even if it had been true that some Savages do exist with no conception whatever of Living Beings higher than themselves, it would be no proof whatever that such

* "History of Religion," p. 6.

was the primeval condition of Man. The arguments adduced in a former chapter, that the most degraded savagery of the present day is or may be the result of Evolution working upon highly unfavorable conditions, are arguments which deprive such facts, even if they existed, of all value in support of the assumption that the lowest savagery was the condition of the first progenitors of our race. Degradation being a process which has certainly operated, and is now operating upon some races, and to some extent, it must always remain a question how far this process may go in paralyzing the activity of our higher powers, or in setting them, as it were, to sleep. It is well, however, that we have no such problem to discuss. Whether any Savages exist with absolutely no religious conceptions is, after all, a question of subordinate importance; because it is certain that, if they exist at all, they are a very extreme case and a very rare exception. It is notorious that, in the case of most Savages and of all Barbarians, not only have they some Religion, but their Religion is one of the very worst elements in their savagery or their barbarism.

Looking now to the facts presented by the existing Religions of the world, there is one of these facts which at once arrests attention, and that is the tendency of all Religions, whether savage or civilized, to connect the Personal Agencies who are feared or worshipped with some material object. The nature of that connection may not be always—it may not be even in any case—perfectly clear and definite. The rigorous analysis of our own thoughts upon such subjects is difficult, even to the most enlightened men. To rude and savage men it is impossible. There is no mystery, therefore, in the fact that the connection which exists between various material objects and the Beings who are worshipped in them or through them, is a connection which remains generally vague in the mind of the worshipper himself. Sometimes the material object is an Embodiment; sometimes it is a Symbol; often it may be only an Abode. Nor is it wonderful that there should be a like variety in the particular objects which have come to be so regarded. Sometimes they are such material objects as the heavenly bodies. Sometimes they are natural productions of our own Planet, such as particular trees, or particular animals, or particular



things in themselves inanimate, such as springs, or streams, or mountains. Sometimes they are manufactured articles, stones or blocks of wood cut into some shape which has a meaning either obvious or traditional.

The universality of this tendency to connect some material objects with religious worship, and the immense variety of modes in which this tendency has been manifested, is a fact which receives a full and adequate explanation in our natural disposition to conceive of all Personal Agencies as living in some Form and in some Place or as having some other special connection with particular things in Nature. Nor is it difficult to understand how the Embodiments, or the Symbols, or the Abodes, which may be imagined and devised by men, will vary according as their mental condition has been developed in a good or in a wrong direction. And as these imaginings and devices are never as we see them now among Savages, the work of any one generation of men, but are the accumulated inheritance of many generations, all existing systems of worship among them must be regarded as presumably very wide departures from the conceptions which were primeval. And this presumption gains additional force when we observe the distinction which exists between the fundamental conceptions of Religious Belief and the forms of worship which have come to be the expression and embodiment of these. In the Religion of the highest and best races, in Christianity itself, we know the wide difference which obtains between the Theology of the Church and the popular superstitions which have been developed under it. These superstitions may be, and often are, of the grossest kind. They may be indeed, and in many cases are known to be, vestiges of Pagan worship which have survived all religious revolutions and reforms; but in other cases they are the natural and legitimate development of some erroneous Belief accepted as part of the Christian Creed. Here, as elsewhere, Reason working on false data has been, as under such conditions it must always be, the great agent in degradation and decay.

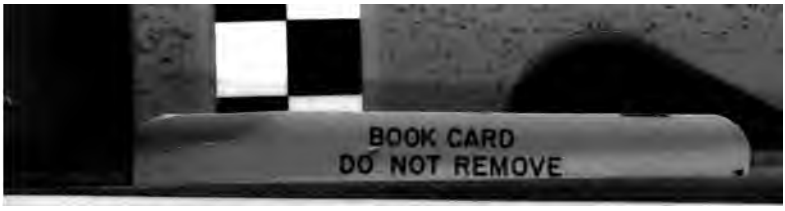
CHAPTER XII.

ON THE CAUSES OF RELIGIOUS CORRUPTION.

THE considerations set forth in the previous chapter indicate the fallacies which lie in our way when we endeavor to collect from the worship of savage nations any secure conclusions as to the origin of Religion. Upon these fallacies, and upon no more safe foundation, Comte built up his famous generalization of the four necessary stages in the history of Religion. First came Fetishism, then Polytheism, and then Monotheism, and last and latest, the heir of all the ages, came Comtism itself, or the Religion of Humanity, which is to be the worship of the future.

Professor Max Müller has done memorable service in the analysis and in the exposure which he has given us of the origin and use of the word "Fetishism," and of the theory which represents it as a necessary stage in the development of Religion.* It turns out that the word itself, and the fundamental idea it embodies, is a word and an idea derived from one of those popular superstitions which are so common in connection with Latin Christianity. The Portuguese sailors who first explored the West Coast of Africa were themselves accustomed to attach superstitious value to beads, or crosses, or images, or charms, and amulets of their own. These were called "feiti ços." They saw the negroes attaching some similar value to various objects of a similar kind, and these Portuguese sailors therefore described the negro worship as the worship of "feitiços." President de Brosses, a French philosopher of the Voltairean epoch in literature, then extended the term Fetish so as to include not only artificial articles, but also such great natural features as trees, mountains, rivers, and animals. In this way he was enabled to classify together, under one indiscriminate appellation, many different kinds of worship and many different stages in the history of religious development or

* "Hibbert Lectures," 1878.

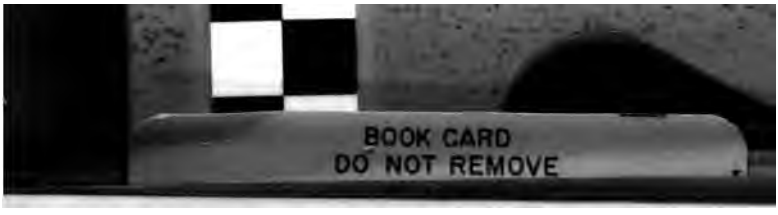


decay. This is an excellent example of the crude theories and false generalizations which have been prevalent on the subject of the origin of Religion. First, there is the assumption that whatever is lowest in savagery must have been primeval—an assumption which, as we have seen, is in all cases improbable, and in many cases must necessarily be false. Next there is great carelessness in ascertaining what is really true even of existing Savages in respect to their religious Beliefs. It has now been clearly ascertained that those very African negroes whose superstitious worship of material articles, supposed to have some mysterious powers or virtues, is most degraded, do nevertheless retain, behind and above this worship, certain Beliefs as to the nature of the Godhead, which are almost as far above their own abject superstitions as the theology of a Fénélon is above the superstitions of an ignorant Roman Catholic peasant. It is found that some African tribes have retained their belief in one Supreme Being, the Creator of the world, and the circumstance that nevertheless no worship may be addressed to Him has received from Professor Max Müller an explanation which is ample. "It may arise from an excess of reverence quite as much as from negligence. Thus the Odjis or Cohantis call the Supreme Being by the same name as the sky; but they mean by it a Personal God, who, as they say, created all things and is the Giver of all good things. But though He is omnipresent and omniscient, knowing even the thoughts of men, and pitying them in their distress, the government of the world is, as they believe, deputed by Him to inferior Spirits, and among these, again, it is the malevolent Spirits only who require worship and sacrifice from man."* And this is by no means a solitary case. There are many others in which the investigations of missionaries respecting the religious conceptions of savage nations have revealed the fact that they have a much higher theology than is indicated in their worship.

The truth is, that nowhere is the evidence of development in a wrong direction so strong as in the many customs of savage and barbarous nations which are more or less directly connected with Religion. The idea has long been abandoned that

* "Hibbert Lectures," pp. 107, 108.

the Savage lives in a condition of freedom as compared with the complicated obligations imposed by Civilization. Savages, on the contrary, are under the tyranny of innumerable Customs which render their whole life a slavery from the cradle to the grave. And what is most remarkable is the irrational character of most of these Customs, and the difficulty of even imagining how they can have become established. They bear all the marks of an origin far distant in time—of a connection with doctrines which have been forgotten, and of conceptions which have run, as it were, to seed. They bear, in short, all the marks of long attrition, like the remnants of a bed of rock which has been broken up at a distant epoch of geological time, and has left no other record of itself than a few worn and incoherent fragments in some far-off conglomerate. Just as these fragments are now held together by common materials which are universally distributed, such as sand or lime, so the worn and broken fragments of old Religions are held together, in the shape of barbarous customs, by those common instincts and aspirations of the human Mind which follow it in all its stages, whether of growth or of decay. The rapidity of the processes of degradation in Religion, and the extent to which they may go, depends on a great variety of conditions. It has gone very far indeed, and has led to the evolution of Customs and Beliefs of the most destructive kind among races which, so far as we know, have never been exposed to external conditions necessarily degrading. The innate character of this tendency to corruption, arising out of causes inherent in the nature of Man, becomes indeed all the more striking when we find that some of the most terrible practices connected with religious superstition, are practices which have become established among tribes which are by no means in the lowest physical condition, and who inhabit countries highly blest by Nature. Perhaps there is no example of this phenomenon more remarkable than the "customs" of Dahomey, a country naturally rich in products, and affording every facility for the pursuits of a settled and civilized life. Yet here we have those terrible Beliefs which demand the constant, the almost daily sacrifice of human life, with no other aim or purpose than to satisfy some imaginary Being with the sight of clotted gore and with the smell of



putrefying human flesh. This is only an extreme and a peculiarly terrible example of a general law, the operation of which is more or less clearly seen in every one of the Religions of the heathen world, whether of the past or of the present time. In the very earliest ages in which we become acquainted with the customs of their worship, we find these in many respects strange and unaccountable, except on the supposition that even then they had come from far, and had been subject to endless deviations and corruptions through ages of a long descent.

Of no Religion is this more true than of that which was associated with the oldest Civilization known to us—the Civilization of Egypt. So strange is the combination here of simple and grand conceptions with grotesque symbols and with degrading objects of immediate worship, that it has been the inexhaustible theme of curious explanations. Why a Snake or why a Dung-beetle should have been taken to represent the Divine Being, and why in the holiest recess of some glorious Temple we find enshrined as the object of adoration the image or the coffin of some beast, or bird, or reptile, is a question on which much learned ingenuity has been spent. It has been suggested, for example, that a conquering race, bringing with it a higher and a purer faith, suffered itself to adopt or to embody in its system the lower symbolism of a local worship. But this explanation only removes the difficulty—if it be one—a step farther back. Why did such sufferance arise? why was such an adoption possible? It was possible simply because there is an universal tendency in the human Mind to developments in the wrong direction, and especially in its spiritual conceptions to become more and more gross and carnal.

Nor is it difficult to follow some, at least, of the steps of consequence, that is to say, the associations of thought, by which worship may become degraded when once any serious error has been admitted. Animal worship, for example, may possibly have begun with very high and very profound conceptions. We are accustomed to regard it as a very grotesque and degraded worship, and so no doubt it was in its results. But if we once allow ourselves to identify the Divine Power in Nature with any one of its operations, if we seek for the visible presence of the Creator in any one of His creations, I do not

know that we could choose any in which that Presence seems so imminent as in the wonderful Instincts of the lower animals. In a previous chapter we have seen what knowledge and what foreknowledge there is involved in some of these. We have seen how it often seems like direct Inspiration that creatures without the gift of Reason should be able to do more than the highest human Reason could enable us to do—how wonderful it is, for example, that their prevision and provision for the nurture and development of their young, should cover the whole cycle of operations in that second work of creation which is involved in the Metamorphoses of insects —all this, when we come to think of it, may well seem like the direct working of the Godhead. We have seen in a former chapter that men of the highest genius in philosophical speculation, like Descartes, and men of the highest skill in the popular exposition of scientific ideas, like Professor Huxley, have been led by these marvels of Instinct to represent the lower animals as automata or machines. The whole force and meaning of this analogy lies in the conception that the work done by animals is like the work done by the mechanical contrivances of men. We look always upon such work as done not by the machine but by the contriving Mind which is outside the machine, and from whom its adjustments are derived. Fundamentally, however little it may be confessed or acknowledged, this is the same conception which, in a less scientific age, would take another form. What is seen in the action of an automaton is not the mechanism but the result. That result is the work of Mind, which seems as if it were indwelling in the machine. In like manner, what is seen in animals is the wonderful things they do; and what is not seen, and is indeed wholly incomprehensible, is the machinery by which they are made to do it. Moreover, it is a machinery having this essential distinction from all human machines, that it is endowed with Life, which in itself also is the greatest mystery of all.

It is, therefore, no superficial observation of animals, but, on the contrary, a deep pondering on the wonders of their economy, which may have first suggested them to religious men as at once the Type and the Abode of that Agency which is supreme in Nature. I do not affirm as an historical fact that

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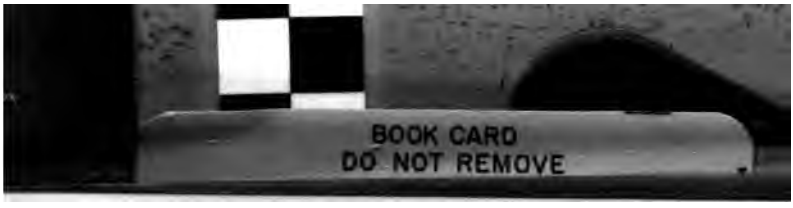
this was really the origin of Animal-worship, because that origin is not historically known, and, like the origin of Religion itself, it must be more or less a matter of speculation. Some animals may have become objects of worship from having originally been the subjects of sacrifice. The victim may have been so associated with the God to whom it was devoted as to become His accepted Symbol. The Ox and the Bull may well have been consecrated through this process of substitution. But no such explanation can be given in respect to many animals which have been worshipped as divine. Perhaps no further explanation need be sought than that which would be equally required to account for the choice of particular plants, or particular birds and fishes, as the badges of particular tribes and families of men. Such badges were almost universal in early times, and many of them are still perpetuated in armorial bearings. The selection of particular animals in connection with worship would be determined in different localities by a great variety of conditions. Circumstances purely accidental might determine it. The occurrence, for example, in some particular region of any animal with habits which are at once curious and conspicuous, would sufficiently account for the choice of it as the Symbol of whatever idea these habits might most readily suggest or symbolize. It is remarkable, accordingly, that in some cases, at least, we can see the probable causes which have led to the choice of certain creatures. The Egyptian Beetle, the Scarabæus, for example, represents one of those forms of Insect life in which the marvels of Instinct are at once very conspicuous and very curious. The characteristic habit of the Scarabæus Beetle is one which involves all that mystery of prevision for the development of the species which is common among insects, coupled with a patient and laborious perseverance in the work required, which does not seem directly associated with any mere appetite or with any immediate source of pleasure. The instinct by which this beetle chooses the material which is the proper nidus for its egg, the skill with which it works that material into a form suitable for the purpose, and the industry with which it then rolls it along the ground till a suitable position is attained—all these are a striking combination of the wonders of Animal Instinct, and conspicuous indica-

tion of the Spirit of Wisdom and of Knowledge which may well be conceived to be present in their work.

But although it is in this way easy to imagine how some forms of Animal-worship may have had their origin in the first perception of what is really wonderful, and in the first admiration of what is really admirable, it is also very easy to see how, when once established, it would tend to rapid degradation. Wonder and reverence are not the only emotions which impel to worship. Fear and even horror, especially when accompanied with any mystery in the objects of alarm, are emotions suggesting, perhaps more than any, that low kind of worship which consists essentially in the idea of Deprecation. Some hideous and destructive animals, such as the Crocodile, may have become sacred objects neither on account of anything admirable in their instincts nor on account of their destructiveness, but, on the contrary, because of being identified with an agency which is beneficent. To those who live in Egypt, the Nile is the perennial source of every blessing necessary to life. An animal so characteristic of that great River may well have been chosen simply as the Symbol of all that it was and of all that it gave to men. There is no mystery, therefore, in the Crocodile being held sacred in the worship of the God of Inundation. But there are other animals which have been widely invested with a sacred character, in respect to which no such explanation can be given. The worship of Serpents has been attributed to conceptions of a very abstract character—with the circle, for example, into which they coil themselves considered as an emblem of Eternity. But this is a conception far too transcendental and far-fetched to account either for the origin of this worship, or for its wide extension in the world. Serpents are not the only natural objects which present circular forms. Nor is this attitude of their repose, curious and remarkable though it be, the most striking peculiarity they present. They have been chosen, beyond any reasonable doubt, because of the horror and terror they inspire. For this, above all other creatures, they are prominent in Nature. For their deceptive coloring,—for their insidious approach,—for their deadly virus,—they have been taken as the type of spiritual poison in the Jewish narrative of the Fall. The power of inflicting almost



immediate death, which is possessed by the most venomous Snakes, and that not by violence, but by the infliction of a wound which in itself may be hardly visible, is a power which is indeed full of mystery even to the most cultivated scientific mind, and may well have inspired among men in early ages a desire to pacify the Powers of Evil. The moment this becomes the great aim and end of worship, a principle is established which is fertile in the development of every foul imagination. Whenever it is the absorbing motive and desire of men to do that which may most gratify or pacify Malevolence, then it ceases to be at all wonderful that men should be driven by their religion to sacrifices the most horrid, and to practices the most unnatural.

But if we wish to see an illustration and an example of the power of all conceptions of a religious nature in the rapid evolution of unexpected consequences, we have such an example in the case of one man who has lived in our own time, and who still lives in the school which he has founded. I refer to Auguste Comte. It is well known that he denied the existence, or at least denied that we can have any knowledge of the existence, of such a Being as other men mean by God. Mr. John Stuart Mill has insisted with much earnestness and with much force that, in spite of this denial, Auguste Comte had a Religion. He says it was a Religion without a God. But the truth is, that it was a Religion having both a creed and an ideal object of worship. That ideal object of worship was an abstract conception of the Mind so definitely invested with Personality that Comte himself gave to it the title of The Great Being (*Grand Etre*). The abstract conception thus personified was the abstract conception of Humanity—Man considered in his past, his present, and his future. Clearly this is an intellectual Fetish. It is not the worship of a Being known or believed to have any real existence. It is the worship of an Idea shaped and moulded by the Mind, and then artificially clothed with the attributes of Personality. It is the worship of an article manufactured by the imagination, just as Fetishism, in its strictest meaning, is the worship of an article manufactured by the hand. Nor is it difficult to assign to it a place in that classification of Religions in which a loose signification has been assigned to the term

Fetishism. The worship of Humanity is merely one form of Animal-worship. Indeed, Comte himself specially included the whole Animal Creation. It is the worship of the Creature Man as the consummation of all other Creatures, with all the marvels and all the unexhausted possibilities of his moral and intellectual nature.

The worship of this Creature may certainly be in the nature of a Religion, as much higher than other forms of Animal-worship as Man is higher than a Beetle or an Ibis or a Crocodile, or a Serpent. But so also, on the other hand, it may be a Religion as much lower than the worship of other animals, in proportion as Man can be wicked and vicious in a sense in which the Beasts cannot. Obviously therefore such a worship would be liable to special causes of degradation. We have seen it to be one of the great peculiarities of Man, as distinguished from the lower animals, that whilst they always obey and fulfil the highest law of their Being, there is no similar perfect obedience in the case of Man. On the contrary, he often uses his special powers with such perverted ingenuity that they reduce him to a condition more miserable and more degraded than the condition of any Beast. It follows that the worship of Humanity must, as a Religion, be liable to corresponding degradation. The Philosopher, or the Teacher, or the Prophet who may first personify this abstract conception, and enshrine it as an object of worship, may have before him nothing but the highest aspects of human nature and its highest aspirations. Mill has seen and has well expressed the limitations under which alone such a worship could have any good effect. "That the ennobling power of this grand conception may have its full efficacy, he should, with Comte, regard the *Grand Etre*, Humanity or Mankind, as composed in the past solely of those who, in every age and variety of position, have played their part worthily in life. It is only as thus restricted that the aggregate of our species becomes an object worthy of our veneration."* This, no doubt, was Comte's own idea. But how are his disciples and followers to be kept up to the same high standard of conception? Comte seems to have been personally a very high-minded and a very pure-minded man. His morality was austere, almost ascetic,

* Mill's "Comte and Positivism," p. 136.

and his spirit of devotion found delight in the spirit of the Christian Mystics. Yet even in his hands the development of his conceptions led him to results eminently irrational, although it cannot be said that they were ever degrading or impure. But we have only to consider how comparatively rare are the examples of the highest human excellence, and how common and prevailing are the vices and weaknesses of Humanity, to see how terrible would be the possibilities and the probabilities of corruption in a Religion which had Man for the highest object of its worship.

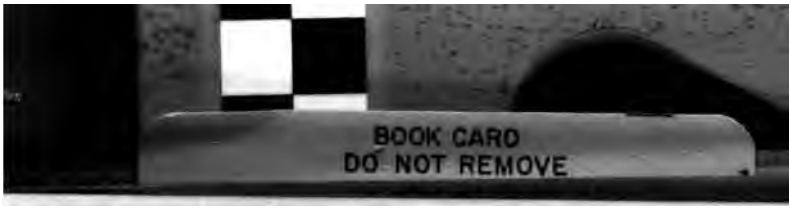
Nor is this all that is to be said on the inevitable tendency to degradation which must attend any worship of Humanity. Not only are the highest forms of human virtue rare, but even when they do occur, they are very apt to be rejected and despised of men. Power and strength, however vicious in its exercise, almost always receives the homage of the world. The human Idols, therefore, who would be chosen as Symbols in the worship of Humanity would often be those who set the very worst examples to their Kind. Perhaps no better illustration of this could be found than the history of Napoleon Buonaparte. I think it is impossible to follow that history, as it is now known, without coming to the conclusion that in every sense of the word he was a bad man—unscrupulous, false, and mean. But his intellect was powerful, whilst his force and energy of character were tremendous. These qualities alone, exhibited in almost unexampled military success, were sufficient to make him the Idol of many minds. And as mere success secured for him this place, so nothing but failure deprived him of it. Not a few of the chosen heroes of Humanity have been chosen for reasons but little better. Comte himself, seeing this danger, and with an exalted estimate and ideal of the character of Womanhood, had laid it down that it would be best to select some woman as the symbol, if not the object of private adoration in the worship of Humanity. The French Revolutionists selected a woman, too, and we know the kind of woman that they chose. It may be wise, perhaps, to set aside this famous episode in a fit of national insanity as nothing more than a profane joke; but the developments of Anthropomorphism in the mythology of the Pagan world are a sufficient indication of the

kind of worship which the worship of Humanity would certainly tend to be.

The result, then, of this analysis of that in which all Religion essentially consists, and of the objects which it selects, or imagines, or creates for worship, is to show that in Religion above all other things the processes of Evolution are especially liable to work in the direction of Degradation. That analysis shows how it is that in the domain of religious conceptions, even more than in any other domain of thought, the work of Development must be rapid, because in the absence of Revelation or the teachings of Authority, fancy and imagination have no guide and are under no restraint.

When, now, we pass from the phenomena which Religion presents in the present day to what we know of its phenomena in the earliest historic times, the conclusions we have reached receive abundant confirmation. Of the origin of Religion, indeed, as we have already seen, History can tell us nothing, because, unless the Mosaic narrative be accepted, there is no history of the origin of Man. But the origin of particular systems of Religion does come within the domain of History, and the testimony it affords is always to the same effect. In regard to them we have the most positive evidence that they have been uniformly subject to Degradation. All the great Religions of the world which can be traced to the teaching or influence of individual men have steadily declined from the teaching of their Founders. In India it has been one great business of Christian missionaries and of Christian governors, in their endeavors to put an end to cruel and barbarous customs, to prove to the corrupt disciples of an ancient Creed that its first Prophets or Teachers had never held the doctrines from which such customs arise, or that these customs are a gross misconception and abuse of the doctrine which had been really taught. Whether we study what is now held by the disciples of Buddha, of Confucius, or of Zoroaster, it is the same result. Wherever we can arrive at the original teaching of the known Founders of religious systems, we find that teaching uniformly higher, more spiritual, than the teaching now.

The same law has effected Christianity, with this difference *only*, that alone of all the Historical Religious of the world it

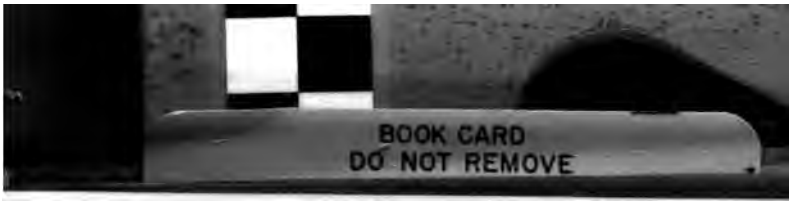


has hitherto shown an unmistakable power of perennial revival and reform. But we known that the processes of corruption had begun their work even in the lifetime of the Apostles; and every Church in Christendom will equally admit the general fact, although each of them will give a different illustration of it. Mahommedanism, which is the last and latest of the great Historical Religions of the world, shows a still more remarkable phenomenon. The corruption in this case began not only in the lifetime, but in the life of the Prophet and Founder of that Religion. Mahomet was himself his own most corrupt disciple. In the earliest days of his mission he was best as a Man and greatest as a Teacher. His life was purer and his doctrine more spiritual when his voice was a solitary voice crying in the wilderness, than when it was joined in chorus by the voice of many millions. In his case the progress of Development in a wrong direction was singularly distinct and very rapid. Nor is the cause obscure. The spirit of Mahomet may well have been in close communion with the Spirit of all truth, when, like St. Paul at Athens, his heart was first stirred within him as he saw his Arabian countrymen wholly given to idolatry. Such deep impressions on some everlasting truth—such overpowering convictions—are in the nature of Inspiration. The intimations it gives and the impulses it communicates are true in thought and righteous in motive, in exact proportion as the reflecting surfaces of the human Mind are accurately set to the lights which stream from Nature. This is the Adjustment which gives all their truthfulness to the intimations of the Senses; which gives all its wisdom and foresight to the wonderful work of Instinct; which gives all their validity to the processes of Reason; which is the real source of all the achievements of Genius, and which, on the highest level of all, has made some men the inspired Prophets of the Oracles of God.

But this is the tenderest of all Adjustments—the most delicate, the most easily disturbed. When this Adjustment is, as it were, mechanical, as it is in the lower animals, then we have the limited, but, within its own sphere, the perfect wisdom of the Beasts. But when this Adjustment is liable to distortion by the action of a Will which is to some extent self-determined and is also to a large extent degraded, when the real Inspira-

tion is not from without, but from within—then the refl
surfaces of Mind are no longer set true to the Light of Na
and then, "If the light within us be darkness, how great i
darkness!" Hence it is that one single mistake or misco
tion as to the nature and work of Inspiration is, and must
mistake of tremendous consequence. And this was Maho
mistake. He thought that the source of his Inspiration w
rect, immediate, and personal. He thought that even the
words in which his own impulses were embodied were dic
by the Angel Gabriel. He thought that the Supreme Auth
which spoke through him when he proclaimed that "the
God Almighty was one God, the Merciful, the Compassion
was the same which also spoke to him when he proclaimed
it was lawful for him to take his neighbor's wife. From
an abounding well-spring of delusion the most bitter w
were sure to come. How different this idea of the metho
which the Divine Spirit operates upon the minds of men
the idea held on the same subject by that great Apostle o
Lord, whose work it was to spread among the Gentile w
those religious conceptions which had so long been the sp
heritage of one peculiar people! How cautious St. Pa
when expressing an opinion not directly sanctioned by a
thority higher than his own! "I think also that I have
Spirit of God." The injunction, "Try the spirits whether
be of God," is one which never seems to have occurred to
homet. The consequences were what might have beer
pected. The utterances of his Inspiration when he was hi
in the caves of Mecca were better, purer, higher than t
which he continued to pour forth when, after his flight to
dina, he became a great Conqueror and a great Ruler. I
the very first indeed he breathed the spirit of personal a
and malediction on all who disbelieved his message. This
of bitterness was present from the beginning. But its dev
ments were indeed prodigious. It was the animating spir
precepts without number which, in the minds and in the h
of his ruthless followers, have inflicted untold miseries
twelve hundred years on some of the fairest regions of
Globe.

Passing now from the evidence of the law of corruption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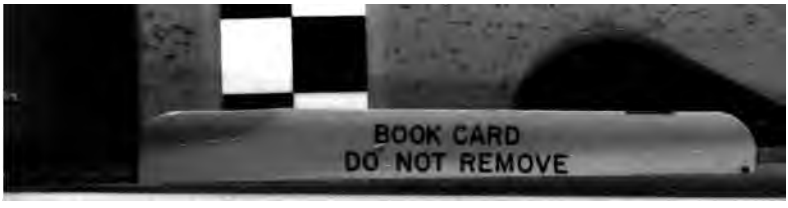
decline which is afforded by this last and latest of the great Historical Religions of the world, we find the same evidence in those of a much older date. In the first place, all the Founders of those Religions were themselves nothing but Reformers. In the second place, the reforms they instituted have themselves all more or less again yielded to new developments of decay. The great Prophets of the world have all been men of Inspiration or of Genius who were revolted by the corruptions of some pre-existing system, and who desired to restore some older and purer faith. The form which their reformation took was generally determined, as all strong revolts are sure to be, by violent reaction against some prominent conception or some system of practice which seemed, as it were, an embodiment of its corruption. In this way only, can we account for the peculiar direction taken by the teaching of that one great historical Religion which is said to have more disciples than any other in the world. Buddhism was in its origin a reform of Brahminism. In that system the Beliefs of a much older and simpler age had become hid under the rubbish-heaps of a most corrupt development. Nowhere perhaps in the world had the work of Evolution been richer in the growth of briers and thorns. It had forged the iron bonds of Caste, one of the very worst inventions of an evil imagination; and it had degraded worship into a complicated system of sacrifice and of ceremonial observances.

There seems to be no doubt that the teaching of the Reformer Sakya Muni (Buddha) was a revolt and a reform. It was a reassertion of the paramount value of a Life of Righteousness. But the intellectual conceptions which are associated with this great ethical and spiritual reform had within themselves the germs of another cycle of decay. These conceptions seem to have taken their form from the very violence of the revulsion which they indicate and explain. The peculiar tenet of Buddhism, which is or has been interpreted to be a denial of any Divine Being or of personal or individual Immortality, seems the strangest of all doctrines on which to recommend a life of virtue, of self-denial, and of religious contemplation. But the explanation is apparently to be found in the extreme and ridiculous developments which the doctrines of Divine Per-

sonality and of individual Immortality had taken under the Brahminical system. These developments do indeed seem almost incredible, if we did not know from many other examples the incalculable wanderings of the human imagination in the domain of religious thought. The doctrine of the transmigration of Souls at death into the bodies of Beasts was a doctrine pushed to such extravagances of conception, and yet believed in with such intense conviction, that pious Brahmins did not dare even to breathe the open air lest by accident they should destroy some invisible animalcule in which was embodied the Spirit of their ancestors. Such a notion of Immortality might well oppress and afflict the spirit with a sense of intolerable fatigue. Nor is it difficult to understand how that desire of complete Attainment, which is, after all, the real hope of Immortality, should have been driven to look for it rather in reabsorption into some one universal Essence, and so to reach at last some final Rest. Freedom from the burden of the flesh, rendered doubly burdensome by the repeated cycles of animal existence which lay before the Brahmin, was the end most naturally desired. For indeed, complete annihilation might well be the highest aspiration of souls who had before them such conceptions of personal Immortality and its gifts.

A similar explanation is probably the true one of the denial of any God. A prejudice had arisen against the very idea of a Divine Being from the concomitant ideas which had become associated with Personality. The original Buddhist denial of a God was probably, in his heart of hearts, merely a denial of the grotesque limitations which had been associated with the popular conception of Him. It was a devout and religious aspect of that most unphilosophical negation which in our own days has been called the "Unconditioned." In short, it was only a metaphysical and not an irreligious, Atheism. But although this was probably the real meaning of the Buddhistic Atheism in the mind of its original teachers, and although this meaning has reappeared and has found intelligent expression among many of its subsequent expounders, it was in itself one of those fruitful germs of error which are fatal in any system of Religion. The negation of any Divine Being or Agency, at least under any aspect or condition conceivable by



Man, makes a vacuum which nothing else can fill. Or rather, it may be said to make a vacuum which every conceivable imagination rushes in to occupy. Accordingly Buddha himself seems to have taken the place of a Divine Being in the worship of his followers. His was a real Personality—his was the Ideal Life. All history proves that no abstract system of doctrine, no mere rule of life, no dreamy aspiration, however high, can serve as an object of worship for any length of time. But a great and a good Man can be always deified. And so it has been with Buddha. Still this deification was, as it were, an usurpation. The worship of himself was no part of the Religion he taught, and the vacuum which he had created in speculative Belief was one which his own Image, even with all the swellings of tradition, was inadequate to fill. And so Buddhism appears to have run its course through every stage of mystic madness, of gross idolatry, and of true fetish-worship, until, in India at least, it seems likely to be re-absorbed in the Brahminism from which it originally sprang.

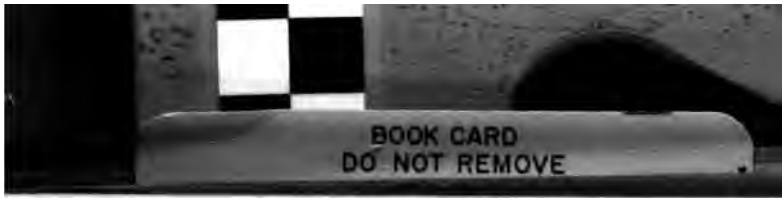
And so we are carried back to the origin of that great Religion, Brahminism, which already in the sixth or seventh century before the Christian era had become so degraded as to give rise to the revolt of Buddha. The course of its development can be traced in an elaborate literature which may extend over a period of about 2000 years. That development is beyond all question one of the greatest interest in the history of Religion, because it concerns a region and a race which have high traditional claims to be identified with one of the most ancient homes, and one of the most ancient families of Man. And surely it is a most striking result of modern inquiry that in this, one of the oldest literatures of the world, we find that the most ancient religious appellation is Heaven-Father, and that the words "Dyauspitar" in which this idea is expressed are the etymological origin of Jupiter—Ζεὺς πατηρ—the name for the supreme Deity in the mythology of the Greeks.*

We must not allow any preconceived ideas to obscure the plain evidence which arises out of this simple fact. We bow to the authority of Sanskrit scholars when they tell us of it. But we shall do well to watch the philosophical explanations with

* "Hibbert Lectures," by Max Müller.

which they may accompany their intimations of its import. Those who approach the subject with the assumption that the Idea of a Divine Being or a Superhuman Personality must be a derivative, and cannot be a primary conception, allow all their language to be colored by the theory that vague perceptions of "The Invisible" or "The Infinite" in rivers, or in mountains, or in sun and moon and stars, were the earliest religious conceptions of the human Mind. But this theory cannot be accepted by those who remember that there is nothing in Nature so near to us as our own nature,—nothing so mysterious and yet so intelligible,—nothing so invisible, yet so suggestive of energy and of power over things that can be seen. Nothing else in Nature speaks to us so constantly or so directly. Neither the Infinite nor the Invisible contains any religious element at all, unless as conditions of a Being of which invisibility and infinitude are attributes. There is no probability that any abstract conceptions whatever about the nature or properties of material Force can have been among the earliest conceptions of the human Mind. Still less is it reasonable to suppose that such conceptions were more natural and more easy conceptions than those founded on our own Personality and on the Personality of Parents.

Yet it seems as if it were in deference to this theory that Professor Max Müller is disposed to deprecate the supposition that the "Heaven-Father" of the earliest Vedic Hymns is rightly to be understood as having meant "what we mean by God." Very probably indeed it may have meant something much more simple. But not the less on that account it may have meant something quite as true. I do not know, indeed, why we should set any very high estimate on the success which has attended the most learned Theologians, in giving anything like form or substance to our conceptions of the Godhead. Christianity solves the difficulty by presenting, as the type of all true conceptions on the subject, the image of a Divine Humanity, and the history of a perfect Life. In like manner, those methods of representing the character and attributes of the Almighty, which were employed to teach the Jewish people, were methods all founded on the same principle of a sublime Anthropopsychism. In the New Testament there are not less sublime



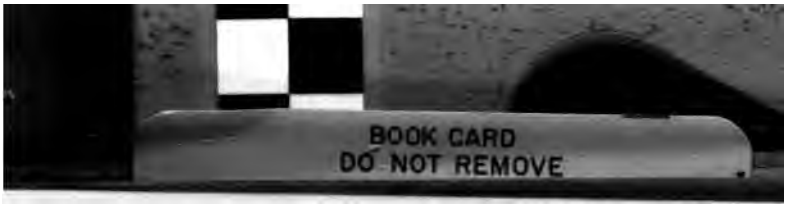
Similitudes, in which the Godhead is identified with the highest and holiest conceptions which we can derive from the material or the spiritual world. Such are the passages, "God is Love," and again "God is Light, and in Him is no Darkness at all." But when we come to the abstract definitions of subsequent Theology, they invariably end either in self-contradictions or in words in which beauty of rhythm takes the place of intelligible meaning. Probably no body of men ever came to draw up such definitions with greater advantages than the Reformers of the English Church. They had before them all the sublime imagery of the Prophets—all the profound similitudes of the Apostles—all the traditions of the Christian world—all the language of Philosophy—all the subtleties of the Schools. Yet of the Godhead, they can only say as a negative definition, that God is "without body, parts, or passions." But, if by "passion" we are to understand all mental affections, this definition is not only in defiance of the whole language of the Jewish and of the Christian Scriptures, but in defiance also of all that is conceivable of the Being who is the Author of all good, and the fountain of all love, but who hates evil, and is angry with the wicked every day. A great master of the English tongue has given another definition in which, among other things, it is affirmed that the attributes of God are "incommunicable." * Yet, at least, all the good attributes of all creatures must be conceived as communicated to them by their Creator, in whom all fulness dwells.

I do not know, therefore, by what title we are to assume that "what we mean by God" is certainly so much nearer the truth than the simplest conceptions of a Primeval Age. It is at least possible that in that Age there may have been intimations of the Divine Personality, and of the Divine Presence which we have not now. Moreover, there may have been developments of error in this high matter, which may well shake our confidence in the unquestionable superiority of "what we mean by God" over what may have been meant and understood by our earliest fathers in respect to the Being whom they adored. Some conceptions of the Divine Being which have been prevalent in the Christian Church, have been formed upon theolog-

* J. H. Newman, "Idea of a University," p. 60.

ical traditions so questionable that the developments of them have been among the heaviest burdens of the Faith. It is not too much to say that some of the doctrines derived from scholastic Theology and once most widely accepted in the Christian Church—such, for example, as the fate of unbaptized Infants—are doctrines which present the nature and character of the Godhead in aspects as irrational as they are repulsive. One of the most remarkable schools of Christian thought which has arisen in recent times is that which has made the idea of the "Fatherhood of God" the basis of its distinctive teaching. Yet it is nothing but a reversion to the simplest of all ideas, the most rudimentary of all experiences—that which takes the functions and the authority of a Father as the most natural image of the Invisible and Infinite Being to whom we owe "life and breath and all things." In the facts of Vedic literature, as now sifted and presented to us by scholars, when we carefully separate these facts from theories about them, there is really no symptom of any time when the idea of some Living Being in the nature of God had not yet been attained. On the contrary the earliest indications of this conception are indications of the sublimest character, and the process of Evolution seems distinctly to have been a process not of an ascending but of a descending order. Thus it appears that the great appellative "Dyaus," which in the earliest Vedic literature is masculine and stood for "The Bright or Shining One," or the Living Being whose dwelling is the Light, had in later times become a feminine and stood for nothing but the sky.* It is quite evident that in the oldest times of the Aryan race, in so far as those times have left us any record, not only had the idea of a Personal God been fully conceived, but such a Being had been described, and addressed in language and under symbols which are comparable with the sublimest imagery in the Visions of Patmos. How firmly, too, and how naturally these conceptions of a God were rooted in the analogies of our own human Personality is attested by the additional fact that Paternity was the earliest Vedic idea of Creation, and Dyaus was invoked not only as the Heaven-Father but specially as the "Dyaush pitâ ganitâ," which is the Sanskrit equivalent of the Greek Ζεὺς πατὴρ γενετήρ.

* "Hibbert Lectures," pp. 276, 277.

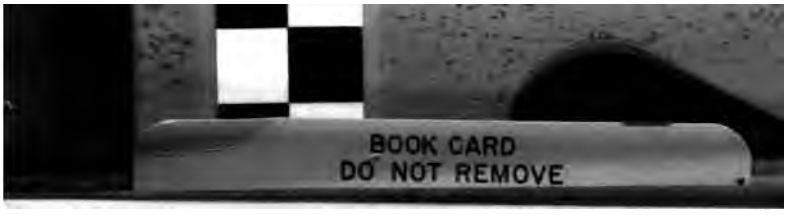


When, again, we are told by Sanskrit scholars that the earliest religious conceptions of the Aryan race, as exhibited in the Veda, were Pantheistic, and that the Gods they worshipped were "Deifications" of the Forces or Powers of Nature, we are to remember that this is an interpertation and not a fact. It is an interpretation, too, which assumes the familiarity of the human mind in the ages of its infancy with one of the most doubtful and difficult conceptions of modern science—namely, the abstract conception of Energy or Force as an inseparable attribute of Matter. The only fact, divested of all preconceptions, which these scholars have really ascertained is, that in compositions which are confessedly poetical the Energies of Nature were habitually addressed as the Energies of Personal or Living Beings. But this fact does not in the least involve the supposition that the Energies of Nature which are thus addressed had, at some still earlier epoch, been regarded under the aspect of Material Forces, and had afterwards come to be Personified; nor does it in the least involve the other supposition that, when so Personified, they were really regarded as so many different Beings absolutely separate and distinct from each other. Both of these suppositions may indeed be matter of argument; but neither of them can be legitimately assumed. They are, on the contrary, both of them open to the most serious, if not to insuperable objections. As regards the first of them—that the earliest human conceptions of Nature were of that most abstruse and difficult kind which consists in the idea of Material Force without any living embodiment or abode, I have already indicated the grounds on which it seems in the highest degree improbable. As regards the second supposition, viz., that when Natural Forces came to be Personified each one of them was regarded as the embodiment of a separate and distinct Divinity—this is a most unsafe interpretation of the language of poetry. The purest Monotheism has a Pantheistic side. To see all things in God is very closely related to seeing God in all things. The giving of separate names to diverse manifestations of one Divine Power may pass into Polytheism by insensible degrees. But it would be a most erroneous conclusion from the use of such names at a very early stage in the history of religious development, that those who so

employed them had no conception of One Supreme Being. In the Philosophy of Brahminism even, in the midst of its most extravagant Polytheistic developments, not only has this idea been preserved, but it has been taught and held as the central idea of the whole system. "There is but one Being—no second." Nothing really exists but the one Universal Spirit, called Brahmin; and whatever appears to exist independently is identical with that Spirit.* This is the uncompromising creed of true Brahminism. If, then, this creed can be retained even amidst the extravagant Polytheism of later Hindu corruptions, much more easily could it be retained in the early Pantheism of the Vedic Hymns.

There is, however, one kind of evidence remaining, which may be said to be still within the domain of history, and that is the evidence derived from Language, from the structure and etymology of words. This evidence carries us a long way further back, even to the time when Language was in the course of its formation, and long before it had been reduced to writing. From this evidence, as we find it in the facts reported respecting the earliest forms of Aryan speech, it seems certain that the most ancient conceptions of the energies of Nature were conceptions of Personality. In that dim and far-off time, when our pre-historic ancestors were speaking in a language long anterior to the formation of the oldest Sanskrit, we are told that they called the Sun the Illuminator, or the Warmer, or the Nourisher; the Moon, the Measurer; the Dawn, the Awakener; the Thunder, the Roarer; the Rain, the Rainer; the Fire, the Quick-Runner.† We are told further that in these Personifications the earliest Aryans did not imagine them as possessing the material or corporeal Forms of Humanity, but only that the activities they exhibited were most easily conceived as comparable with our own. Surely this is a fact which is worth volumes of speculation. What was most easy and most natural then, must have been most easy and most natural from the beginning. With such a propensity in the earliest men of whom we have any authentic record to see personal agency in everything, and with the general impression

* Professor Monier Williams, "Hinduism," p. 11.
† Max Müller, "Hibbert Lectures," 1878, p. 193.



of unity and subordination under one system which is suggested by all the phenomena of Nature, it does not seem very difficult to suppose that the fundamental conception of all Religion may have been in the strictest sense primeval.

But the earliest records of Aryan worship and of Aryan speech, are not the only evidences we have of the comparative sublimity of the earliest known conceptions of the Divine Nature. The Egyptian records are older still; and some of the oldest are also the most sublime. A hymn to the rising and setting sun, which is contained in the 125th chapter of the "Book of the Dead," is said by Egyptian scholars to be "the most ancient piece of poetry in the literature of the world." * In this hymn the Divine Deity is described as the Maker of Heaven and of Earth, as the Self-existent One; and the elementary Forces of Nature, under the curious and profound expression of the "Children of Inertness," are described as His instruments in the rule and government of Nature.† Nor is it less remarkable that these old Egyptians seem to have grasped the idea of Law and Order as a characteristic method of the Divine government. He who alone is truly the Living One, is adored as living in the Truth, and in Justice considered as the unchanging and unchangeable Rule of Right in the Moral World, and of Order in Physical Causation.‡ The same grand conception has been traced in the Theology of the Vedas. The result of all this historical evidence may be given in the words of M. Renouf: "It is incontestably true that the sublimer portions of the Egyptian Religion are not the comparatively late result of a process of development or elimination from the grosser. The sublimer portions are demonstrably ancient; and the last stage of the Egyptian Religion, that known to the Greek and Latin writers, was by far the grossest and most corrupt."

* Renouf, "Hibbert Lectures," 1879, p. 197.
† Ibid., pp. 198, 199.
‡ Ibid., pp. 119, 120.

CHAPTER XIII.

RECAPITULATIONS AND CONCLUSIONS.

In a previous chapter I have observed how little we think of the assumptions which are involved in putting such questions as that respecting the origin of Religion. And here we have come to a point in our investigations at which it is very needful to remember again what some of these assumptions are. In order to do so let us look back for a moment and see where we stand.

We have found the clearest evidence that there is a special tendency in religious conceptions to run into developments of corruption and decay. We have seen the best reason to believe that the Religion of Savages, like their other peculiarities, is the result of this kind of evolution. We have found in the most ancient records of the Aryan language proof that the indications of religious thought are higher, simpler, and purer as we go back in time, until at last, in the very oldest compositions of human speech which have come down to us, we find the Divine Being spoken of in the sublime language which forms the opening of the Lord's Prayer. The date in absolute chronology of the oldest Vedic literature does not seem to be known. There is a wide discrepancy between high authorities. Professor Max Müller considers that it may possibly take us back 5000 years.* This is probably an extreme estimate, and Professor Monier Williams seems to refer the most ancient Vedic Hymns to a period not much more remote than 1500 B.C.† But whatever that date may be, or the corresponding date of any other very ancient literature, such as the Chinese, or that of the oldest Egyptian papyri, when we go beyond these dates we enter upon a period when we are absolutely without any historical evidence whatever, not only as to the history of Religion, but as to the history and condition of Mankind. We do not know even approximately the time during which he has existed.

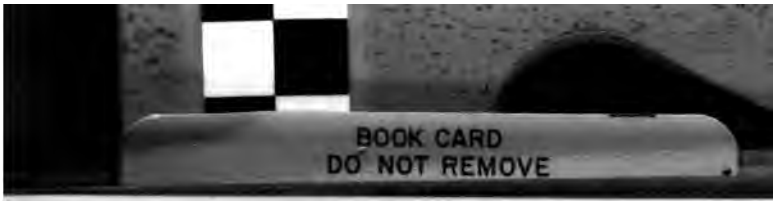
* "Hibbert Lectures," p. 216. † "Hinduism," p. 19.

We do not know the place or the surroundings of his birth. We do not know the steps by which his knowledge "grew from more to more." All we can see with certainty is that the earliest inventions of Mankind are the most wonderful that the race has ever made. The first beginnings of human Speech must have had their origin in powers of the highest order. On this subject there is a dangerous ambiguity in the theories of Scientific Etymology. Very often they seem to imply that Speech is the cause instead of being the consequence of Intellectual Conceptions. From the first it has been Mind that has informed the Voice, and not Voice that has informed the Mind. Associated ideas have preceded associated sounds. It is not Language that has made Thought possible. It is Thought that has built up Language as an embodiment of itself. The function of Speech is not to originate Conceptions, but to express them, and to make them easy of communication and exchange. And so all the other acquirements of primeval times have been as it were the spontaneous growths and fruits of Mind. The first use of fire and the discovery of the methods by which it can be kindled; the domestication of wild animals; and above all the processes by which the various Cereals were first developed out of some wild Grasses—these are all discoveries with which in ingenuity and in importance no subsequent discoveries may compare. They are all unknown to History—all lost in the light of an effulgent Dawn. In speculating, therefore, on the origin of these things, we must make one or other of two assumptions—either that Man always had the same mental faculties and the same fundamental intellectual constitution that he has now, or that there was a time when these faculties had not yet risen to the level of Humanity, and when his mental constitution was essentially inferior.

On the first of these assumptions we proceed on the safe ground of inquiry from the known to the unknown. We handle a familiar thing; we dissect a known structure; we think of a known agency. We speculate only on the manner of its first behavior. Even in this process we must take a good deal for granted—we must imagine a good deal that is not easily conceivable. If we try to present to our own minds any distinct image of the first Man, whether we suppose him to have been

specially created or gradually developed, we shall soon find that we are talking about a Being and about a condition of things of which Science tells us nothing, and of which the Imagination even cannot form any definite conception. The temptation to think of that Being as a mere Savage is very great, and this theory underlies nine-tenths of all speculations on the subject. But, to say the very least, this may not be true, and valid reasons have been adduced to show that it is in the highest degree improbable. That the first Man should have been born with all the developments of Savagery, is as impossible as that he should have been born with all the developments of Civilization. The next most natural resource we have is to think of the first Man as something like a Child. But no man has ever seen a Child which never had a Parent as human as itself, or some one to represent such a Parent. We can form no picture in our mind's eye of the mental condition of the first Man, if we suppose him to have had no communication with, and no instruction from, some Intelligence other than his own. A Child that has never been taught anything, and has never seen example, is a creature of which we have no knowledge, and of which therefore we can form no definite conception.

Our power of conceiving things is, of course, no measure of their possibility. But it may be well to observe where the impossibilities of conception are, or may be, of our own making. It is at least possible that the first Man may not have been born or created in the condition which we find to be so inconceivable. He may have been a Child, but having, what all other children have, some intimations of Authority and some acquaintance with its Source. At all events, let it be clearly seen that the denial of this possibility is an assumption; and an assumption too which establishes an absolute and radical distinction between Childhood as we know it, and the inconceivable conditions of a Childhood which was either without Parents, or with Parents who were comparatively Beasts. Professor Max Müller has fancied our earliest forefathers as creatures who at first had to be "roused and awakened from mere staring and stolid wonderment," by certain objects "which set them for the first time musing, pondering, and thinking on the visions floating before their eyes." This is a picture evidently



framed on the assumption of a Fatherless Childhood—of a Being born into the world with all the innate powers of Man, but absolutely deprived of all direct communication with any Mind or Will analogous to his own. No such assumption is admissible as representing any reasonable probability. But at least such imaginings as these about our First Parents have reference to their external conditions only, and do not raise the additional difficulties which are involved in the supposition that the first Man was half a Beast.

Very different is the case upon this other of the two assumptions which have been indicated above. On the assumption that there was a time when Man was different in his own proper nature from that nature as we know it now—when he was merely an animal not yet developed into a Man—on this assumption another element of the unknown is introduced, which is an element of absolute confusion. It is impossible to found any reasoning upon data which are not only unknown, but are in themselves unintelligible and inconceivable. Now it seems as if many of those who speculate on the origin of Religion have not clearly made up their minds whether they are proceeding on the first of these assumptions or on the second; that is to say, on the assumption that Man has always been, in respect to Faculty, what he now is, or on the assumption that he was once a Beast. Perhaps, indeed, it would be strictly true to say that many of those who speculate on the origin of Religion proceed upon the last of these assumptions without avowing it, or even without distinctly recognizing it themselves. It may be well, therefore, to point out here that on this assumption the question cannot be discussed at all. We must begin with Man as Man, when his development or his creation had made him what he is; not indeed as regards the acquisitions of experience or the treasures of knowledge, but what he is in Faculty and in Power, in the structure and habit of his Mind, in the instincts of his intellectual and moral nature.

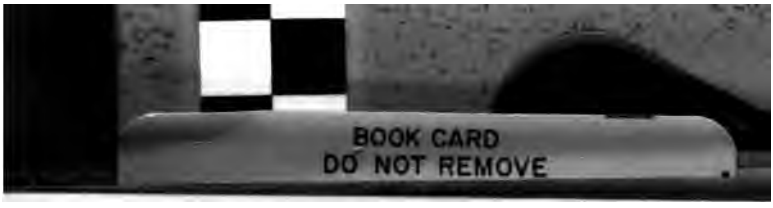
But, as we have also seen in a former chapter,* there are two other assumptions between which we must choose. Besides assuming something as to the condition and the powers of the first Man, we must also make one or other of two assumptions

* Chap. XI., *ante*.

as to the existence or non-existence of a Being to whom his Mind stands in close relation. One is the assumption that there is no God; and then the problem is, how Man came to invent one. The other is that there is a God; and then the question is, whether He first formed, and how long He left His Creature without any intuition or revelation of Himself.

It is really curious to observe in many speculations on the origin of Religion how unconscious the writers are that they are making any assumption at all on this subject. And yet in many cases the assumption distinctly is that, as an objective Reality, God does not exist, and that the conception of such a Being is built up gradually out of wonderings and guessings about "the Infinite" and "the Invisible."

On this assumption I confess that it does not appear to me to be possible to give any satisfactory explanation of the origin of Religion. As a matter of fact, we see that the tendency to believe in divine or superhuman Beings is a universal tendency in the human Mind. As a matter of fact, also, we see that the conceptions which gather round this Belief—the ideas which grow up and are developed from one consequence to another respecting the character of these superhuman Personalities and their relations to Mankind—are beyond all comparison the most powerful agencies in moulding human nature for evil or for good. There is no question whatever about the fact that the most terrible and destructive Customs of barbarian and of savage life are customs more or less directly connected with the growth of religious superstitions. It was the perception of this fact which inspired the intense hatred of Religion, as it was known to him, which breathes in the memorable poem of Lucretius. In all literature there is no single line more true than the famous line—"Tantum religio potuit suadere malorum." Nor is it less certain, on the other hand, that the highest type of human virtue is that which has been exhibited in some of those whose whole inspiration and rule of life has been founded on religious faith. Religious conceptions have been historically the centre of all Authority, and have given their strength to all ideas of Moral Obligation. Accordingly, we see that the same hatred which inspired Lucretius against Religion because of its power for evil, now inspires other men



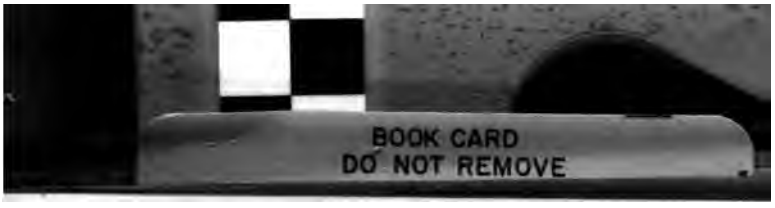
against it because of its power for good. Those who wish to sever all the bonds which bind human society together, the State, the Church, the Family, and whose spirits are in fierce rebellion against all Law, human or divine, are, and must be, bitter enemies of Religion. The idea must be unendurable to them of a Ruler who cannot be defied, of a Throne which cannot be overturned, of a Kingdom which endureth throughout all generations. The Belief in any Divine Personality as the source of the inexorable laws of Nature is a Belief which enforces, as nothing else can enforce, the idea of Obligation and the duty of Obedience.

It is not possible, in the light of the Unity of Nature, to reconcile this close and obvious relation between religious conceptions and the highest conditions of human life with the supposition that these conceptions are nothing but a dream. The power exercised over the mind and conduct of Mankind, by the Belief in some Divine Personality with whom they have to do, is a power having all the marks that indicate an integral part of the System under which we live. But if we are to assume that this Belief does not represent a fact, and that its origin has been any other than a simple and natural perception of that fact, then this negation must be the groundwork of all our speculations on the subject, and must be involved, more or less directly, in every argument we use. But even on this assumption it is not a reasonable explanation of the fundamental postulates of all Religion—namely, the existence of superhuman Beings—to suppose that the idea of Personality has been evolved out of that which is Impersonal; the idea of Will out of that which has no Intelligence; the idea of Life out of that which does not contain it.

On the other hand, if we make the only alternative assumption—namely, that there is a God, that is to say, a Supreme Being, who is the Author of Creation—then the origin of Man's perception of this fact ceases to have any mystery other than that which attaches to the origin of all the other elementary perceptions of his Mind and Spirit. Not a few of these perceptions tell him of realities which are as invisible as the Godhead. Of his own passions, and of the passions of other men, his perception is immediate—of his own love, of his own

anger, of his own possession of just authority. The sense of owing obedience may well be as immediate as the sense of a right to claim it. Moreover, seeing the transcendent power of this perception upon his conduct, and, through his conduct, upon his fate, it becomes antecedently probable, in accordance with the analogies of Nature and of all other created Beings, that from the very first, and as part of the outfit of his nature, some knowledge was imparted to him of the existence of his Creator, and of the duty which he owed to Him.

Of the methods by which this knowledge was imparted to him, we are as ignorant as of the methods by which other innate perceptions were implanted in him. But no special difficulty is involved in the origin of a perception which stands in such close relation to the Unity of Nature. It has been demanded indeed, as a postulate in this discussion, that we should discard all notions of antecedent probability—that we should take nothing for granted, except that Man started on his course furnished with what are called his Senses, and with nothing more. And this demand may be acceded to provided it be well understood what our Senses are. If by this word we are to understand nothing more than the gates and avenues of approach through which we derive an impression of external objects—our sight, and touch, and smell, and taste, and hearing—then, indeed, it is the most violent of all assumptions that they are the only faculties by which knowledge is acquired. There is no need to put any disparagement on these Senses, or to undervalue the work they do. Quite the contrary. It has been shown in a former chapter how securely we may rest on the wonder and on the truthfulness of these Faculties as a pledge and guarantee of the truthfulness of other Faculties which are conversant with higher things. When we think of the Mechanism of the Eye, and of the inconceivable minuteness of the ethereal movements which that Organ enables us to separate and to discriminate at a glance, we get hold of an idea having an intense interest and a supreme importance. If Adjustments so fine and so true as these have been elaborated out of the Unities of Nature, whether suddenly by what we imagine as Creation, or slowly by what we call Development, then may we have the firmest con-

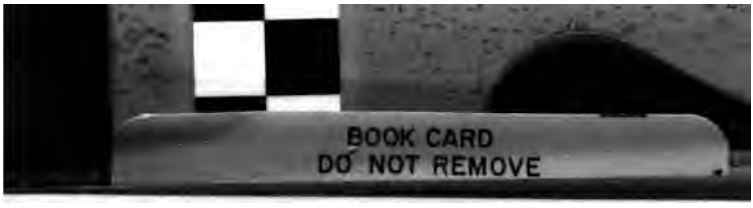


fidence that the same Law of Natural Adjustment has prevailed in all the other Faculties of the perceiving and conceiving Mind. The whole structure of that Mind is, as it were, revealed to be a Structure which is in the nature of a Growth —a Structure whose very property and function it is to take in and assimilate the truths of Nature—and that in an ascending order, according to the rank of those truths in the System and Constitution of the Universe. In this connection of thought too great stress cannot be laid on the wonderful language of the Senses. In the light of it the whole Mind and Spirit of Man becomes one great mysterious Retina for reflecting the images of Eternal Truth. Our moral and intellectual perceptions of things which in their very nature are invisible, come home to us as invested with a new authority. It is the authority of an Adjusted Structure—of a mental organization which has been moulded by what we call natural causes—these being the causes on which the Unity of the World depends.

And when we come to consider how this moulding, and the moulding of the human Body, deviates from that of the lower animals, we discover in the nature of this deviation a Law which cannot be mistaken. That Law points to the higher power and to the higher value in his economy of Faculties which lie behind the Senses. The human frame diverges from the frame of the Brutes, so far as the mere bodily senses are concerned, in the direction of greater helplessness and weakness. Man's sight is less piercing than the Eagle's. His hearing is less acute than the Owl's or the Bat's. His sense of smell may be said hardly to exist at all when it is compared with the exquisite susceptibilities of the Dog and of the Deer, of the Weasel, or of the Fox. The whole principle and plan of structure in the Beasts which are supposed to be nearest to him in form, is a principle and a plan which is almost the converse of that on which his structure has been organized. The so-called man-like Apes are highly specialized; Man on the contrary is as highly generalized. They are framed to live almost entirely on trees, and to be dependent on arboreal products, which only a very limited area in the Globe can supply. Man is framed to be independent of all local conditions, except indeed those extreme conditions which are incompatible with

the maintenance of Organic Life in any form. If it be true therefore, that he is descended from some "arboreal animal with pointed ears," he has been modified during the steps of that descent on the principle of depending less and less on Senses such as the lower animals possess, and more and more on what may be called the Senses of his Mind. The unclothed and unprotected condition of the human body, the total absence of any organic weapon of defence, the want of teeth adapted even for prehension, and the same want of power for similar purposes in the hands and fingers—these are all changes and departures from the mere animal type which stand in obvious relation to the mental powers of Man. Apart from these they are changes which would have placed the new Creature at a hopeless disadvantage in the struggle for existence. It is not easy to imagine,—indeed we may safely say that it is impossible to conceive—the condition of things during any intermediate steps in such a process. It seems as if there could be no safety until it had been completed—until the enfeebled Physical Organization had been supported and re-enforced by the new capacities for Knowledge and Design.

This, however, is not the point on which we are dwelling now. We are not now speculating on the origin of Man. We are considering him only as he is, and as he must have been since he was Man at all. And in that structure as it is, we see that the bodily Senses have a smaller relative importance than in the Beasts. To the Beasts these Senses tell them all they know. To us they speak but little compared with all that our Spirit of Interpretation gathers from them. But that Spirit of Interpretation is in the nature of a Sense. In the lower animals every external stimulus moves to some appropriate action. In Man it moves to some appropriate thought. This is an enormous difference; but the principle is the same. We can see that, so far as the mechanism is visible, the plan or the principle of that mechanism is alike. The more clearly we understand that this organic mechanism has been a Growth and a Development, the more certain we may be that in its structure it is self-adapted, and that in its working it is true. And the same principle applies to those other Faculties of our mental constitution which have no outward Organ to indicate the



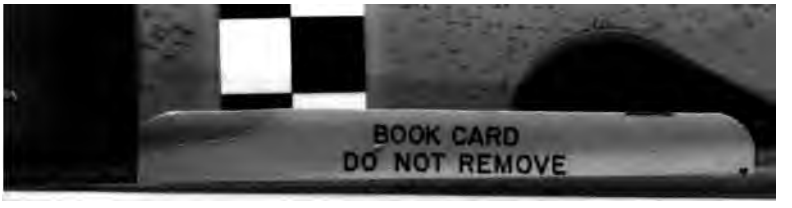
machinery through which their operations are conducted. In them the Spirit of Interpretation is in communication with the realities which lie behind phenomena—with energies which are kindred with its own.

And so we come to understand that the processes of Development or of Creation, whatever they may have been, which culminated in the production of a Being such as Man, are processes wholly governed and directed by a Law of Adjustment between the higher Truths which it concerns him most to know, and the evolution of Faculties by which alone he could be enabled to apprehend them. There is no difficulty in conceiving these processes carried to the most perfect consummation, as we do see them actually carried to very high degrees of excellence in the case of a few men of extraordinary genius, or of extraordinary virtue. In science the most profound conclusions have been sometimes reached without any process of conscious reasoning. It is clearly the law of our nature, however, that the triumphs of Intellect are to be gained only by laborious thought, and by the gains of one generation being made the starting-point for the acquisition of the next. This is the general law. But it is a law which itself assumes certain primary Intuitions of the Mind as the starting-point of all. If these were wrong, nothing could be right. The whole processes of reasoning would be vitiated from the first. The first Man must have had these as perfectly as we now have them, else the earliest steps of Reason could never have been taken, and the earliest rewards of discovery could never have been secured.

But there is this great difference between the moral and intellectual nature of Man, that whereas in the work of Reasoning the perceptions which are primary and intuitive require to be worked out and elaborately applied, in Morals the perceptions which are primary are all in all. It is true that here also the applications may be infinite, and the doctrines of Utility have their legitimate application in enforcing, by the Sense of Obligation, whatever course of conduct Reason may determine to be the most fitting and the best. The Sense of Obligation in itself is, like the sense of logical sequence, elementary, and, like it, is part and parcel of our mental constitution. But unlike the

mere sense of logical sequence, the sense of moral Obligation has one necessary and primary application which from the earliest moment of Man's existence may well have been all-sufficient. Obedience to the will of legitimate Authority is, as we have seen in a former chapter, the first duty and the first idea of duty in the mind of Every Child. If ever there was a Man who had no earthly Father, or if ever there was a Man whose Father was, as compared with himself, a Beast, it would seem a natural and almost a necessary supposition that, along with his own new and wonderful power of self-consciousness, there should have been associated a consciousness also of the Presence and the Power of that Creative Energy to which his own Development was due. It is not possible for us to conceive what form the consciousness would take. "No man hath seen God at any time. This absolute declaration of one of the Apostles of the Christian Church proves that they accepted as metaphorical the literal terms in which the first communications between Man and his Creator are narrated in the Jewish Scriptures. It is not necessary to suppose that the Almighty was seen by His first human Creature walking in bodily form in a garden "in the cool of the day." The strong impressions of a spiritual Presence and of spiritual communications which have been the turning-point in the lives of men living in the bustle of a busy and corrupted world, may well have been even more vivid and more immediate when the first "Being worthy to be called a man" stood on this Earth alone. The light which shone on Paul of Tarsus on the way to Damascus may have been such a light as shone on the Father of our race. Or the communication may have been what metaphysicians call purely subjective, such as in all ages of the world do sometimes "flash upon that inward eye which is the bliss of solitude." But none the less may they have been direct and overpowering. The earliest and simplest conception of the Divine Nature might well also be the best. And although we are forbidden to suppose the embodiment and visibility of the Godhead, we are not driven to the alternative of concluding that there never could have been anything which is to us unusual in the intimations of His presence.

Yet this is another of the unobserved assumptions which are



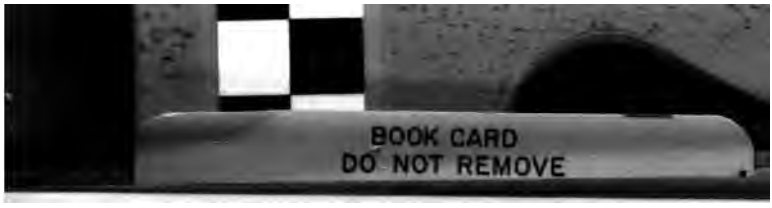
perpetually made—the assumption of an Uniformity in Nature which does not exist. That "all things have continued as they are since the Beginning" is conceivable. But that all things should have continued as they were since before the Beginning is a contradiction in terms. In primeval times many things had then just been done of which we have no knowledge now. When the Form of Man had been fashioned and completed for the first time, like and yet unlike to the bodies of the Beasts; when all their Organs had been lifted to a higher significance in his; when his hands had been liberated from walking and from climbing, and had been elaborated into an instrument of the most subtle and various use; when his feet had been adapted for holding him in the erect position; when his breathing apparatus had been set to musical chords of widest compass and the most exquisite tones; when all his Senses had become ministers to a Mind endowed with Wonder and with Reverence, and with Reason and with Love—then a work had been accomplished such as the world had not known before, and such as has never been repeated since.

All the conditions under which that work was carried forward must have been happy conditions—conditions, that is to say, in perfect harmony with its progress and its end. They must have been favorable, first, to the production, and then to the use, of those higher Faculties which separated the new Creature from the Beasts. They must have been in a corresponding degree adverse to and incompatible with the prevalence of conditions tending to reversion or to degradation in any form. That long and gradual ascent, if we assume it to have been so,—or, as it may have been, that sudden Transfiguration,—must have taken place in a congenial air and amid surroundings which lent themselves to so great a change. On every conceivable theory, therefore, of the origin of Man, all this seems a necessity of thought. But perhaps it seems on the Theory of Development even more a Necessity than on any other. It is of the essence of that Theory that all things should have worked together for the good of the Being that was to be. On the lowest interpretation, this "toil co-operant to an end" is always the necessary result of forces ever weaving and ever interwoven. On the higher interpretation it is the same. Only, some Worker is ever

behind the work. But under either interpretation the conclusion is the same. That the first Man should have been a Savage, with instincts and dispositions perverted as they are never perverted among the Beasts, is a supposition impossible and inconceivable. Like every other creature, he must have been in harmony with his origin and his end—with the path which had led him to where he stood, with the work which made him what he was. It may well have been part of that work—nay, it seems almost a necessary part of it—to give to this new and wonderful Being some knowledge of his Whence and Whither—some open vision, some Sense and Faculty Divine.

With arguments so deeply founded on the Analogies of Nature in favor of the conclusion that the first Man, though a Child in acquired knowledge, must from the first have had instincts and intuitions in harmony with his origin and with his destiny, we must demand the clearest proof from those who assume that he could have had no conception of a Divine Being, and that this was an idea which could only be acquired in time from staring at things too big for him to measure, and from wondering at things too distant for him to reach. Not even his powers could extract from such things that which they do not contain. But in his own Personality, fresh from the hand of Nature,—in his own Spirit just issuing from the fountains of its birth,—in his own Will, willing according to the Law of its Creation,—in his own Desire of Knowledge,—in his own Sense of Obligation,—in his own Wonder and Reverence and Awe,—he had all the elements to enable him at once to apprehend, though not to comprehend, the Infinite Being who was the Author of his own.

It is, then, with that intense interest which must ever belong to new evidence in support of fundamental Truths that we find these conclusions, founded as they are on the analogies of Nature, confirmed and not disparaged by such facts as can be gathered from other sources of information. Scholars who have begun their search into the origin of Religion in the full acceptance of what may be called the savage theory of the origin of Man,—who, captivated by a plausible generalization, had taken it for granted that the farther we go back in time the more certainly do we find all Religion assuming one or other of the gross



and idolatrous forms which have been indiscriminately grouped under the designation of Fetishism—have been driven from this Belief by discovering to their surprise that facts do not support the theory. They have found, on the contrary, that up to the farthest limits which are reached by records which are properly historical, and far beyond those limits to the remotest distance which is attained by evidence founded on the analysis of human Speech, the religious conceptions of men are seen, as we go back in time, to have been not coarser and coarser, but simpler, purer, higher—so that the very oldest conceptions of the Divine Being of which we have any certain evidence are the simplest and the best of all.

In particular, and as a fact of typical significance, we find very clear indications that everywhere Idolatry and Fetishism appear to have been corruptions, whilst the higher and more spiritual conceptions of Religion which lie behind, do generally even now survive among idolatrous tribes as vague surmises or as matters of speculative belief. Nowhere even now, it is confessed, is mere Fetishism the whole of the Religion of any people. Everywhere, in so far as the history of it is known, it has been the work of Evolution,—the development of tendencies which are deviations from older paths. And not less significant is the fact that everywhere in the imagination and traditions of Mankind there is preserved the memory and the belief in a Past better than the Present. "It is a constant saying," we are told, "among African tribes that formerly Heaven was nearer to Man than it is now; that the highest God, the Creator Himself, gave formerly lessons of wisdom to human Beings; but that afterwards He withdrew from them, and dwells now far from them in Heaven." All the Indian races have the same tradition; and it is not easy to conceive how a Belief so universal could have arisen unless as a survival. It has all the marks of being a Memory and not an Imagination. It would reconcile the origin of Man with that Law which has been elsewhere universal in Creation—the Law under which every Creature has been produced not only with appropriate powers, but with appropriate Instincts and Intuitive Perceptions for the guidance of these powers in their exercise and use. Many will remember the splendid lines in which Dante has defined this Law, and has

declared the impossibility of Man having been exempt therefrom :—

> Nell' ordine ch'io dico sono accline
> Tutte nature per diverse sorti
> Più al principio loro, e men vicine ;
> Onde si muovono a diversi porti
> Per lo gran mar dell' essere ; e ciascuna
> Con istinto a lei dato che la porti.
>
> * * * * * *
>
> Nè pur le creature, che son fuore
> D'intelligenzia, quest'arco saetta,
> Ma quelle c'hanno intelletto ed amore.*

The only mystery which would remain is the mystery which arises out of the fact that somehow those Instincts have in Man not only been liable to fail, but that they seem to have acquired apparently an ineradicable tendency to become perverted. But this is a lesser mystery, than the mystery which would attach to the original birth or creation of any Creature in the condition of a human Savage. It is a lesser mystery because it is of the essence of a Being whose Will is comparatively free that he should be able to deviate from his appointed path. The Origin of Evil may appear to us to be a great mystery. But this at least may be said in mitigation of the difficulty, that without the possibility of Evil there could be no possibility of any Virtue. Among the lower animals Obedience has always been a necessity. In man it was raised to the dignity of a duty. It is in this great change that we can see and understand how it is that the very elevation of his nature is inseparable from the possibility of a Fall. The mystery, then, which attaches to his condition now is shifted from his endowments and his gifts to the use he made of them. The question of the origin of Religion is merged and lost in the question of the origin of Man. And that other question, how his Morals and how his Religion came to be corrupted, becomes intelligible on the supposition of wilful disobedience with all its tendencies and consequences having become "inherited and organized in the race."

It is indeed most curious and instructive to observe that this formula of expression which has arisen in a School of Philoso-

* "Paradiso," canto i. 110–120.

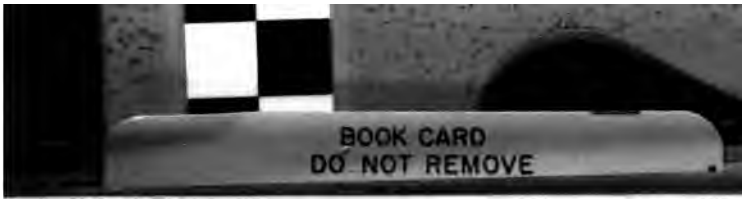
phy specially opposed to all theological conceptions, is one which seems as if it had been invented to give scientific form to that doctrine of the Christian Church which perhaps of all others it is most difficult to accept or understand. If it is the tendency of all action, whether for good or evil, to perpetuate itself, and to descend from one generation to another by hereditary transmission, then we have a strictly scientific explanation of the fact of inherited corruption in human nature, or as it is called in the language of Theology, of Original Sin. It may be that this doctrine has been taught with accretions which do not belong to it, and in forms which have rather concealed than revealed its truth. The very words "Original Sin" do not seem accurately to express a condition of things which is always expressly represented as not original but secondary and superinduced. But it is of the highest interest to observe that men looking into Nature with other views, and very different preconceptions, have seen a Law which really does, in some measure at least, explain the terrible reality of inherited corruption.

Nor is it less remarkable that whilst this Law of action "inherited and organized in the race" does really cover and express the facts of our human nature as well as the Christian doctrine on the subject, it is of no force or value whatever in the particular argument in which it is commonly employed. The Law or the theory of action "inherited and organized" in races was conceived and laid down as a means of getting rid of and superseding the idea of original Instincts and Intuitions. But this it can never do, because, as we have seen, all animal Instincts are inseparably connected with Structure, and are invariably the expression and the index of some Organic Apparatus. Consequently, as every Organic Apparatus is a growth, and is essentially innate, the corresponding impulses of Mind can only have the same origin, and must be innate precisely in the same sense and in the same degree. The truth is that the law of Hereditary Transmission, like the law of Natural Selection, can account for the origin of nothing. Neither of these laws can have any operation except upon things which have already begun to be. Whilst therefore the law of Hereditary Transmission—or as it is now called, the law of Heredity—can never account for the origin of Organic Instincts, it can,

and it does in some degree, account for the perversion of these Instincts. It is not the use, but the abuse of Instincts which needs an explanation. When we seek to know the origin of anything, we assume and start from some anterior condition of things. But simple non-existence is the only condition of things which we can conceive as anterior to the first origin of every Organic Being. Its Organs cannot have been shaped by use; because they must have been formed before they could be used. But when we come to seek an explanation of the origin of perverted Instincts, and of corrupted nature, we have an anterior condition of things which we not only may, but which we must, assume as a necessity of thought. That anterior condition is one in which every action of every living thing began and grew in perfect unison with its corresponding Organic Structure—not preceding that Structure or causing it, but accompanying its growth, and resulting from it. Whilst therefore the law of Heredity can never account for the origin of Instincts or Intuitions which are in harmony with the Order and the Reasonableness of Nature, it may well be accepted in a case where we have to account for tendencies and propensities which have no such character—which are exceptions to the Unity of Nature, and at variance with all that is intelligible in its Order, or reasonable in its Law.

If all explanation essentially consists in the reduction of phenomena into the terms of human thought and into the analogies of human experience, this is the explanation which can alone reconcile the unquestionable Corruption of Human Character with the Analogies of Creation.

I must now bring these chapters to a close. If the conclusions to which they point are true, then we have in them some foundation-stones strong enough to bear the weight of an immense, and, indeed, of an immeasurable superstructure. If the Unity of Nature is not a unity which consists in mere sameness of material, or in mere identity of composition, or in mere uniformity of structure, but a unity which the Mind recognizes as the result of operations similar to its own; if Man, not in his Body only, but in the highest as well as in the lowest

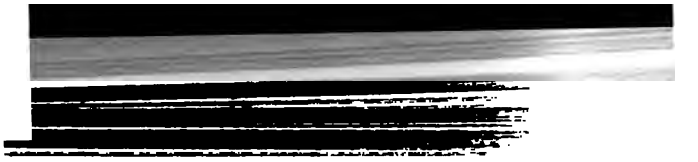


attributes of his Spirit, is inside this Unity and part of it; if all his mental powers are, like the Instincts of the Beasts, founded on an Organic Harmony between his Faculties and the realities of Creation; if the limits of his knowledge do not affect its certainty; if its accepted truthfulness in the lower fields of thought arises out of correspondences and adjustments which are applicable to all the energies of his Intellect, and all the aspirations of his Spirit; if the moral character of Man, as it exists now, is the one great anomaly in Nature—the one great exception to its Order and to the perfect harmony of its laws; if the corruption of this moral character stands in immediate and necessary connection with, and indeed essentially consists in, rebellion against the Authority on which that Order rests; if all ignorance and error and misconception respecting the nature of that Authority and of its commands has been and must be the cause of increasing deviation, disturbance, and perversion; if it is a great natural law that every tendency of thought, and every habit of Mind, whether in a right or in a wrong direction, is prone to become inherited and organized in the race,—then, indeed, we have a view of things which is full of light. Dark as the difficulties which remain may be, they are not of a kind to undermine all certitude, or to discomfit all conviction. On the contrary, it is impressed upon us that the System under which we live, is not only a System accessible to our Intelligence, but so united to it that all the mysteries of the Universe, visible and invisible, are epitomized and enfolded in ourselves. And so we come to feel that our knowledge and our understanding of that System must "grow from more to more" in proportion as the whole of our own nature is laid open to the whole of its intimations, and the highest of our Faculties are kept in conscious and wakeful recognition of the Work and of the Power to which they stand related. Then also it will come to be plain to us that we may expect in that System, and that we may trust to it for, teaching of the highest kind, insomuch that Inspiration and Revelation are to be regarded not as incredible, or even as rare phenomena, but as operations which in various measures and degrees are altogether according to the natural constitution and course of things. For of this kind essentially are all the wonderful Instincts of the

lower animals and all the primary Intuitions of the human Mind. Of this kind especially are all those Gifts and Powers by which alone we can gain the very earliest lessons of Experience or mount the very first steps of Reason. And as these primary Intuitions of the Mind give us our first entrance into some of the realities which lie behind phenomena, so, among these realities there is a still higher region into which our entrance may well be gained only by processes which are analogous. For, just as there are Truths related to the Reason which only the Intellect can appreciate, so there are others related to the Spirit which, in strict analogy, can only be spiritually discerned. And as, on the principle of the Unity of Nature, our Spiritual sense must be the Organic expression and result of a relation with real things, it is to be confidently expected that it can and will be fed with its appropriate food—that it can and will be strengthened and enlightened by communications from a kindred Source.

Let destructive criticism, then, do its work. But let that work be itself subjected to the same rigid analysis which it professes to employ. Under this analysis, unless I am much mistaken, the processes of the Negative Philosophy will be found defective. They systematically suppress more than one-half of the Facts of Nature; and as systematically they silence more than one half of the Faculties of Man. Moreover, the Faculties which they especially try to silence are the very highest Faculties of discernment which Nature gives to us. In the physical sciences we know what results would follow from such methods of treatment. Our work in the human Laboratory is poor and weak enough, and of a thousand substances, having marvellous properties, we can give, after all is done, only a poor and beggarly account. But at least in these fields of research we do our very best. Nothing is thrown aside. Nothing is unobserved. Nothing is unrecorded. Every particle is kept that it may tell its story. Nor is our care confined to the Atoms or to the Molecules which can be weighed or measured. For when the Visible is transcended, we strain all the powers of Language to express the purely intellectual conceptions of Force and Energy, of Affinity and of Attraction, which are needed to help our understanding of the facts and of their dynam-

ical interpretations. With all these helps, that understanding remains imperfect. Yet in the far more difficult work of interpreting the vast System of Nature, with all its immeasurable wealth of Mind, the Agnostic philosophy deliberately sets aside everything that is kindred with the highest parts of our own moral and intellectual Structure. These are all absolutely excluded from the meanings and the sequences—from the anticipations and the analogies of Creation. To those who have grasped the great Doctrine of the Unity of Nature, and have sounded the depth of its meaning and the sweep of its applications, this method of inquiry will appear self-condemned. That which pretends to be the universal solvent of all Knowledge, and of all Belief, will be found to be destitute of any power to convict of falsehood the universal Instinct of Man, that by a careful and conscientious use of the appropriate means—by listening to the appropriate Voices—he can, and he does attain—in the spiritual regions of the Invisible, as well as in the material regions of the Physical World—to a substantial knowledge of the Truth.



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PRIMEVAL MAN.

AN

EXAMINATION OF SOME RECENT SPECULATIONS.

BY

THE DUKE OF ARGYLL.

AUTHOR OF "THE REIGN OF LAW."

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PREFACE.

HAVING now no immediate prospect of being able to expand or to illustrate the argument contained in the following pages, I republish it with very little alteration from the form in which it originally appeared in *Good Words*. I am well aware how much it requires both expansion and illustration. But I hope that at least the main lines of that argument are traced with sufficient clearness to enable others with more leisure to pursue them farther, and to test the results arrived at by our growing knowledge in the sciences which bear upon the early condition of Mankind. The distinctions here taken between different branches of the subject, have not, so far as I know, been elsewhere laid down with adequate precision. Yet all safe reasoning depends upon such distinctions being carefully observed. If they are sound, they place an insuperable bar in the way of certain conclusions respecting Primeval Man, which have been too hastily assumed as following from recently discovered facts. At all events these conclusions can only be reached by new arguments and by new methods of proof.

Many of the questions which are involved in the reasoning of this Essay, are questions which touch upon the profoundest problems of our nature and of our history:—on the connection, seemingly inseparable, between all mental phenomena and physical organization; on the truthfulness of any system of classification which does not take equal cognizance of both; on the distinction between intellectual powers and moral character; on the distinction, again, between the mere results of accumulated knowledge, and the working of the original faculties of Reason; on the question how far the first use and the first direction of his mental powers may have been as purely instinctive in Man as in the Bee or in the Beaver; on the relation between the

two tendencies in Man to advance and to decline; on the causes of degradation which are born with him and seem to be inseparable from his nature; on the bearing upon the whole argument of existing facts respecting his distribution on the globe, and the obvious effects upon him of hardship and of suffering to produce, or to intensify, a barbarous condition;—on each and all of these questions, which enter into the reasoning of this Essay, whole volumes might be written without exhausting what is to be said upon them. I shall be content, in the mean time, if this slight sketch of so great a subject should be of any use in directing others into some well-defined paths of thought and of investigation in regard to it.

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PRIMEVAL MAN.

PART I.

INTRODUCTORY.

At the meeting, in 1867, of the British Association for the Advancement of Science, a paper was read by Sir J. Lubbock upon "The Early Condition of Mankind." It purports to be a reply to a lecture on the "Origin of Civilization" by Dr. Whately, the late Archbishop of Dublin, which was published in 1854. The Archbishop's position is shortly this,—that mere savages—that is to say, "men in the lowest degree, or even anything approaching to the lowest degree, of barbarism in which they can possibly subsist at all—never did and never can, unaided, raise themselves into a higher condition;" that even when they are brought into contact with superior races, it is extremely difficult to teach them the simplest arts; that they "seem never to invent or discover anything," because even "necessity is not the mother of invention except to those who have some degree of thoughtfulness and intelligence;" that whatever the natural powers of the human mind may be, they require to have some instruction from without wherewith to start. He holds it to be "a complete moral certainty that men left unassisted in what is called a state of nature—that is, with the faculties Man is born with not at all unfolded or exercised by education—never did, and never can, raise themselves from that condition." Therefore, "according to the present course of things, the first introducer of civilization among savages is, and must be, man in a more improved state." But as "in the beginning of the human race there was no *man* to effect it," this must have been the work of another Being. "There must have been, in short, something of a revelation made to the first

or to some subsequent generation of our species." The conclusion is that, as Man must have had a Divine Creator, it seems equally certain that, to some extent also, he must have had a Divine Instructor.

This is the argument which Sir J. Lubbock has undertaken to refute. His conclusion is, that the "primitive condition of mankind was one of utter barbarism;" that from this condition certain races have independently raised themselves; and, of course, that, instead of existing savages being the degenerate descendants of ancestors who were more advanced, all races now civilized are the children of men who were once in the same low condition. A further conclusion, though not formally asserted, is plainly indicated, viz. this,—that the "utter barbarism" of the first man was itself an advance on the condition of some progenitor. I infer that this idea is intended to be conveyed when the "first men" are explained to mean the "first beings worthy to be so called."

The two main lines of argument pursued by Sir J. Lubbock connect themselves with the two following propositions which he undertakes to prove:—1st, "That there are indications of progress even among savages;" and 2d, "That among the most civilized nations there are traces of original barbarism."

Sir J. Lubbock's paper has confirmed an impression I have long had, that Whately's argument, though strong at some points, is at others open to assault; and that, as a whole, the subject now requires to be differently handled, and regarded from a different point of view. On the other hand, the same paper has convinced me that the argument in favor of what may be called the Savage-theory is very much the weaker of the two, and rests upon a method of treatment much more inadequate and incomplete.

I propose in this, and in some following chapters, to set forth the reasoning upon which these convictions rest.

There are, however, some preliminary considerations which it may be well to deal with before proceeding farther.

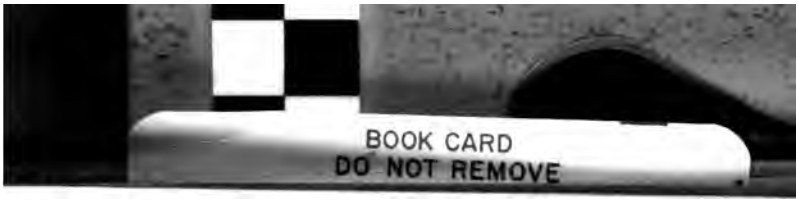
It will be observed that both arguments are avowedly conducted irrespective of any belief in the Mosaic narrative of Creation. They both profess to be purely scientific; that is, founded on natural knowledge, and using for the discovery of

truth such facts and inferences as are ascertainable by reason. Whately expressly says that in his argument he has not appealed to the Book of Genesis as an authority, because he "thought it important to show, independently of that authority and from a monument actually before our eyes—the existence, namely, of civilized man—that there is no escaping such conclusions as agree with the Bible narrative." The opposite argument is, of course, maintained always from the same basis of scientific independence, and those who urge it do not generally profess or care to reconcile the conclusion arrived at, with the Mosaic narrative. Sir J. Lubbock at the close of his paper says emphatically, "These views follow, I think, from strictly scientific considerations." No doubt, if the inquiry is to be pursued at all upon this basis, it must be conducted honestly, and the conclusions legitimately reached must be accepted with just so much of conviction as is justified by the nature of the data, and the nature of the reasoning employed.

The question may well arise in many minds in reference to this subject, whether it is a legitimate subject of speculation at all—whether it does not transcend our faculties to ascertain the truth.

Respecting this question, there is one answer which is obvious, although it may not go far to satisfy those whose scruples are most sincere. When men in the position of the late Archbishop of Dublin enter upon this discussion, and declare that, independent of all authority, certain conclusions can be shown to be unavoidable by natural reason, we cannot prohibit others from entering upon the same ground, or from producing such arguments as they may be able to find in support of an opposite conclusion. But there are some better arguments than this. This, indeed, is enough to show that the discussion must, as a matter of necessity, be encountered, even though it should be deplored. But other considerations may perhaps convince us that it ought not to be avoided. It may be true, and I believe it to be true, that the desire of knowledge is capable of excess. The spirit which in the ordinary concerns of life is condemned as idle or vicious curiosity has, surely, its counterpart in the higher pursuits of intellect. David seems to imply as much when he pleads in favor of his own character and conduct be-

fore God—"I do not exercise myself in things too high for me." On the other hand, we must remember that in nothing has the human race been more liable to the delusions of superstition than in the conception of the matters which were to be held, or were not to be held, as forbidden to investigation. Those physical laws of nature which are now so familiar to us as the peculiar field of observation and discovery—a field on which the march of intellect has been so rapid and so triumphant—were once held by the early Greek philosophers as belonging to the most secret things of God. They thought, perhaps not unnaturally, that a region which lay, or seemed to lie, so much nearer to themselves, even their own mind and spirit—its phenomena and its methods of procedure—must be the ground most open to their search, and must afford results most comprehensible to the understanding. And so they plunged into all the problems of Metaphysics. But there are no mysteries so deep as these—none in which the human mind reaches so soon the limit of its powers—none in which the temptation is stronger to strain after knowledge which is shrouded in impenetrable darkness. The greatest intellects which the world has ever seen have labored at such problems, and, in respect at least to many of them, have left them as they found them. The same tendency of metaphysical speculation, blending, through the school of Alexandria, with the mysticism of the East, infected the Theology of the early Church, and heretics were not seldom divided from the orthodox upon questions which were not only beyond the reach of reason, but equally beyond the scope of Revelation. In the Confessions of St. Augustine there is a curious indication of this transposition of the questions which are deemed to be the most legitimate, and the most accessible, subjects of our research. In early life he had been, as is well known, led away by the dangerous speculations which pass in ecclesiastical history under the name of the Manichæan heresy. He pours out his lamentations over the subtleties which had once engrossed and perplexed his mind—subtleties of which Christianity had revealed the folly. And among the temptations which he still desires to overcome is the appetite of knowledge—a "vain and curious desire hiding under the name of science" (lib. x. c. 35).



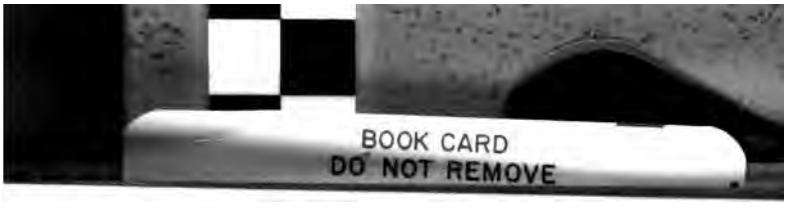
This is the desire which pretends, he says, to reach the inmost secrets of nature—secrets which when discovered could have no value, and of which men desire and expect nothing except to know. Now, here we have an exact definition of the true scientific spirit—a spirit which has, indeed, in its results, richly "endowed the human family with new mercies," but which never has had this dower in view as its only, or even as its chief, inducement. It is not perhaps exactly relevant to observe that the glorious facts of Astronomy are among the secrets of nature which Augustine rejoices to say he no longer desires to know; because, in his mind, Astronomy took the form of Astrology, to which in his youth he had been much addicted. But Augustine is right when he detects the same love of mere knowledge in the instinctive arrest of his attention by the commonest works of nature. He desires to be delivered even from this. He has given up many pleasures of the eye and curiosities of the mind in which he once delighted,—not only the transits of the heavenly bodies and the response of oracles, but even the public spectacles of the Roman world. Still, he deplores that this wretched love of mere knowledge,—this lust of the eyes,—is ever pursuing him as he walks and lives. Although no longer tempted to go to the Amphitheatre to see the race of hound and hare, he complains that the same sight, if seen accidentally in the fields, will divert his attention from some profound meditation. Even from the windows of his home his eye is caught by some little lizard catching flies upon the wall, or by some spider spreading for the capture her wondrous web. The smallness of these creatures, he confesses, does not diminish his instinctive curiosity. True it is that he might pass from these creatures to magnify the Creator of them all. But he is conscious that this was not present to his thoughts when they were arrested and fixed upon the things he saw.

Most true! and equally true was it that this desire of knowledge was burning intensely in him when it wrung from him no confession; or rather, when it was interwoven into the very tissue of which his immortal Confessions are composed. In them no more splendid passages occur than those in which he turns the eye of his curiosity inwards upon the secrets of his

own nature, and asks a thousand unanswerable questions on the structure and the power of Memory. What and where are those innumerable chambers,—those vast halls,—which hold in perpetual imagery not only all he had ever seen, but all he had ever conceived and known? How can the immensities of Time and Space, of earth, and sky, and ocean, be thus contained? How can they be recalled into what seemed a lost existence? What depths and mysteries of being! How little can we understand ourselves! Does it not seem then as if the mind were too narrow to comprehend itself? And so, through pages of most subtle and eloquent analysis, he revels in that faculty of Wonder, which is the very root and principle of all curious inquiry. I do not say that these questions are wholly vain. But they are useful only as all knowledge may be useful, in teaching us—if it be nothing else—how small that knowledge is. St. Augustine was right in thinking that this wonderful power of Memory lies close to the final secrets on which our very being and personality depend. An eminent philosopher of our own time has found in Memory the only insuperable difficulty in the way of reducing the definition of ourselves into that of mere "Possibilities of Feeling." * But in pursuing these speculations into the most inscrutable of all subjects, St. Augustine is but following the instincts of the same restless and curious intellect which had once struggled with the questions, What Matter is, and How Evil came to be? There is no inquiry in which the human mind comes so immediately to the limit of its powers, as in the analysis of itself. Inscrutable questions may indeed be asked as to what Man once was. But questions much more inscrutable may be asked, and are habitually asked, as to what Man now is. No conclusions in respect to the original condition of our race can be more shocking to reason and common sense, than many conclusions which metaphysicians have pretended to establish respecting its condition now.

Another reason against declining this inquiry, is to be found in the fact that the plea of impotence against the human understanding, is a plea which may be urged in the service of the most irrational error, as easily as, perhaps more easily than, in

* Mr. J. S. Mill. I have discussed elsewhere the logic and the adequacy of this definition:—"The Reign of Law." Fifth Edition. Note D.



the service of the most certain truths. Men engrossed by some particular theory are under immense temptation to denounce the power of faculties whose function it is to apprehend ideas differing from their own. At the present moment this is the habitual practice of a whole school of thinkers, who have eyes for nothing but a particular class of facts, and who therefore very naturally resort to the assertion that all eyes with a wider range of vision are eyes of "phantasy." And if this has been sometimes the result of the anatomy of Mind, what are we to say of the anatomy of the Body? We cannot even think of our bodily frames without encountering at once all the facts which connect the phenomena of Mind with the structure and condition of Material Organs. And then our Organism as a whole, how close it stands to that of the beasts that perish! Are we to close these paths of investigation also, because some minds have been led by them to a gross materialism? It is not on one subject of inquiry, but in all, that we come speedily to questions which cannot be answered. The result therefore is, that we should never be jealous of research, but always jealous of presumption,—that on all subjects Reason should be warned to keep within the limit of her powers, but from none should Reason be warned away. Men who denounce any particular field of thought are always to be suspected. The presumption is, that valuable things which these men do not like are to be found there. There are many forms of Priestcraft. The same arts, and the same delusions, have been practised in many causes. Sometimes, though perhaps not so often as is popularly supposed, men have been warned off particular branches of physical inquiry, in the supposed interests of Religion. But constantly and habitually, men are now warned from many branches of inquiry, both physical and psychological, in the interests—real enough—of the Positive Philosophy! "Whatever," says Mr. Lewes, "is inaccessible to reason, should be strictly interdicted to research." Here we have the true ring of the old sacerdotal interdicts. Who is to define beforehand what is, and what is not, "inaccessible to reason?" Are we to take such a definition on trust from the priests of this new philosophy? They tell us that all proofs of Mind in the order of the universe, all evidences of purpose, all conce-

tions of plan or of design, in the history of Creation, are the mere product of special "infirmities" of the human intellect. In opposition to these attempts—come from what quarter they may—to limit arbitrarily the boundaries of knowledge, let us maintain the principle that we never can certainly know what is "inaccessible to reason" until the way of access has been tried. In the highest interests of truth, we must resist any and every interdict against research. The strong presumption is that every philosophy which assumes to issue such an interdict, must have reason to fear inquiry.

On these principles it may be affirmed generally that all subjects are legitimate subjects of reasoning in proportion as they are accessible to research; and that the degree in which any given subject is accessible to research cannot be known until research has been attempted.

Within certain limits it is not open to dispute that the early condition of Mankind is accessible to research. Contemporary history reaches back a certain way. Existing monuments afford their evidence for a considerable distance farther. Tradition has its own province still more remote; and latterly Geology and Archæology have met upon common ground—ground in which Man and the Mammoth have been found together.

It has not, however, been sufficiently observed that the inquiry into the Primitive Condition of Mankind resolves itself into three separate questions,—that is to say, three questions which, though connected with each other, can be, and indeed must be, separately dealt with:—

1st. The Origin of Man considered simply as a Species,—that is to say, the method of his creation or introduction into the world.

2d. The Antiquity of Man, or the time in the geological history and preparation of the globe at which this creation or introduction took place.

3d. His Mental, Moral, and Intellectual Condition when first created.

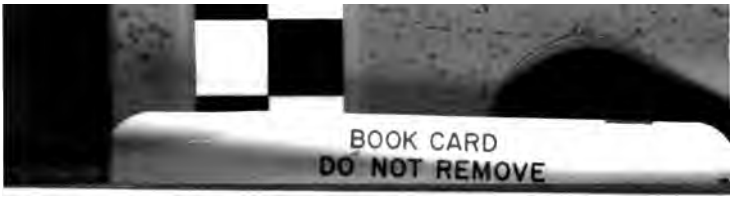
No doubt the theory as to the Origin of Man at which Sir J. Lubbock glances when he speaks of the "first being worthy to be called a man" (which is obviously the theory that this first man was born from some pre-existing creature not worthy to be

so called), is most naturally connected with the farther theory that his mental condition was one of "utter barbarism." But this is not at all a necessary consequence. The first man, however created, may have had special knowledge conveyed to him as well as a special material organization. Special powers of acquiring knowledge he certainly must have had, since we know that these are inseparably connected with the organization which made him "worthy to be called a man." The two questions, therefore, of the Origin of Man, and of his Primitive Condition, are clearly separable. In like manner, as regards Antiquity, the question of Time has no necessary connection either with his Origin or his Primitive Condition.

There is another point connected with this division of the whole subject into three separate questions, which has not perhaps been sufficiently considered, and that is the different degrees of connection which these questions have respectively with the Mosaic narrative. I have already said that the inquiry as conducted both by Archbishop Whately and Sir J. Lubbock is avowedly conducted on a purely scientific basis. It is in the same light that it will be considerd here. But it may be useful to observe in passing, that in regard to some of these questions the Mosaic account of Creation (apart altogether from any suggestions which have been raised as to the allegorical elements it may contain) leaves room, even according to its most literal interpretation, for a much wider latitude of speculation than seems to be generally supposed. As regards the Origin of Man, undoubtedly, the impression conveyed is that the Creation of Man was a special act—which indeed, whatever may have been its method, it must in a sense have been; but, as regards the Primitive Condition of Mankind, it must be remembered that, according to the narrative in Genesis, there never was any generation of men which lived and walked in the primal light. It was the first man who fell. The second man was a murderer. The causes, therefore, of degradation are represented as having begun, so far as the race is concerned, at once; and it is a special peculiarity of the account that those causes are said to have gone on in an accelerating ratio until the Flood. Even after that event there was no immunity from the operation of the same causes, and existing

races, therefore, may have passed through stages of any degree of barbarism since the days of Adam without involving any necessary inconsistency whatever with the Mosaic account.

It is farther to be observed that writers on the Primitive Condition of Man are generally guilty of the oversight of forgetting to define the sense in which they use the words "civilized" and "uncivilized." This is a strange oversight on the part of such a logician as Dr. Whately. Sir J. Lubbock naturally enough feels himself relieved from an inconvenient obligation. But implicitly, if not explicitly, the Savage-theory and the reasoning in support of it assume that civilization consists mainly if not exclusively in a knowledge of the arts. Knowledge, for example, or ignorance, of the use of metals, are, as we shall see, characteristics on which great stress is laid. Now, as regards this point, as Whately truly says, the narrative of Genesis distinctly states that this kind of knowledge did not belong to Mankind at first, but was the fruit of subsequent discovery, through the ordinary agency of those mental gifts with which Man at his creation was endowed. It is assumed in the Savage-theory that the presence or absence of this knowledge stands in close and natural connection with the presence or absence of other and higher kinds of knowledge, of which an acquaintance with the metals is but a symbol and a type. Within certain limits this is true, and we may assume, therefore, that in Genesis also, the intimation given on this subject implies that so far as civilization means a command over the powers of nature, Man was left to make his own way, through his powers of reason, and through his instincts of research. Whately has indeed inferred, from the description given of Cain as a tiller of the ground, and of Abel as a keeper of flocks, that the great economic principle of the division of labor was at the first divinely taught to Man. But, if we are to understand this literally, not of tribes tracing their descent from Cain and Abel, but of the individual men who were the third and fourth human beings upon earth, then we must suppose that the possession of domestic animals and acquaintance with artificial cultivation were either divinely communicated to Man, or instinctively discovered by him, at once. It may have been so, and it may be the intention of the narrative to assert it; but, at all events, it



is perfectly conceivable, that beyond a knowledge of the simplest arts which were necessary for the sustenance of life, Man's primitive condition may have been a condition of mere childhood.

As regards the third element in the whole question—the element of Time—it is well known that all calculations in regard to it rest upon data respecting which there has always been much doubt and difficulty, and that similar data taken from the three existing versions of the Old Testament,—the Hebrew, the Samaritan, and the Septuagint,—give results which vary from each other, not by years, or even by tens of years, but by many centuries. Where differences exist of such magnitude, no confidence can be felt in any of the results. It seems more than questionable how far the history of Man given in the Old Testament either is, or was intended to be, a complete history, of more than the history of typical men and of typical generations. At all events, it would be worse than idle to deny that this question of Time comes naturally and necessarily within the field of scientific investigation, in so far as science can find a firm foundation for any conclusions in regard to it.

Having already quoted St. Augustine upon the general subject of the desire of knowledge, I cannot close even this cursory reference to the relation in which the Mosaic narrative stands to scientific research, without dwelling for a moment on the very striking passage in which that great man deals with the only account which the world possesses of the history of Creation. St. Augustine was not the man to be dead to all those curious speculations and inquiries which that account excites, and which it does not profess to satisfy. His Confessions, he says, would not be the humble confessions he desires them to be, were he not to confess that as regards many of those questions, he does not understand the sense in which Moses wrote. All the more does he admire his words, "so sublime in their humility, so rich in their reserve" (*alta humiliter, pauca copiose*); then follows (lib. xii. c. 31) a passage which,—considering the age in which it was written, considering also the vague notions entertained by St. Augustine himself, and by all the world in his time, on the rank and importance of the natural sciences,—is surely one of the most remarkable passages ever written by

Theologian or Philosopher. "For myself," he says, "I declare boldly, and from the bottom of my heart, that if I were called to write something which was to be invested with supreme authority, I should desire most so to write that my words should include the widest range of meaning, and should not be confined to one sense alone, exclusive of all others, even of some which should be inconsistent with my own. Far from me, O God, be the temerity to suppose that so great a Prophet did not receive from Thy Grace even such a favor! Yes; he had in view and in his spirit, when he traced these words, all that we can ever discover of the truth—even every truth which has escaped us hitherto, or which escapes us still, but which nevertheless may yet be discovered in them." Certain it is, that whatever new views may now be taken of the origin and authorship of the first chapter of Genesis, it stands alone among the traditions of mankind in the wonderful simplicity and grandeur of its words. Specially remarkable—miraculous it really seems to be—is that character of reserve which leaves open to reason all that reason may be able to attain. The meaning of those words seems always to be a meaning ahead of science—not because it anticipates the results of science, but because it is independent of them, and runs, as it were, round the outer margin of all possible discovery.

Having now cleared the ground of some preliminary difficulties which might otherwise have impeded us in a proper access to the subject, I shall proceed in the next Part to deal with the first of the three questions into which that subject is divided—viz. the Origin of Man considered as a Species, in so far as this question appears to be accessible to reason.

PART II.

THE ORIGIN OF MAN.

THE Human Race has no more knowledge or recollection of its own origin than a child has of its own birth. But a child drinks in with its mother's milk some knowledge of the relation in which it stands to its own parents, and as it grows up it knows of other children being born around it. It sees one generation going and another generation coming, so that long before the years of childhood close the ideas of birth and death are alike familiar. Whatever sense of mystery may, in the first dawnings of reflection, have attached to either of these ideas, is soon lost in the familiar experience of the world. The same experience extends to the lower animals—they, too, are born and die. But no such experience ever comes to us casting any light on the Origin of our own Race, or of any other. Some varieties of form are effected in the case of a few animals, by domestication, and by constant care in the selection of peculiarities transmissible to the young. But these variations are all within certain limits; and wherever human care relaxes or is abandoned, the old forms return, and the selected characters disappear. The founding of new forms by the union of different species, even when standing in close natural relation to each other, is absolutely forbidden by the sentence of sterility which Nature pronounces and enforces upon all hybrid offspring. And so it results that Man has never seen the origin of any species. Creation by birth is the only kind of creation he has ever seen; and from this kind of creation he has never seen a new species come. And yet he does know (for this the science of Palæontology has most certainly revealed), that the introduction of new species has been a work carried on constantly and continuously during vast but unknown periods of time. The whole face of animated nature has been changed, not once, but frequently; not suddenly for the most part, perhaps not suddenly in any

case, but slowly and gradually, and yet completely. When once this fact is clearly apprehended—whenever we become familiar with the idea that Creation has had a History, we are inevitably led to the conclusion that Creation has also had a Method. And then the further question arises,—What has this method been? It is perfectly natural that men who have any hopes of solving this question should take that supposition which seems the readiest; and the readiest supposition is, that the agency by which new species are created is the same agency by which new individuals are born. The difficulty of conceiving any other compels men, if they are to guess at all, to guess upon this foundation. Such is the origin and genesis of all the theories of Development, of which Mr. Darwin's hypothesis is only the latest form. It is not in itself inconsistent with the Theistic argument, or with belief in the ultimate agency and directing power of a Creative Mind. This is clear, since we never think of any difficulty in reconciling that belief with our knowledge of the ordinary laws of animal and vegetable reproduction. Those laws may be correctly, and can only be adequately, described in the language of religion and theology. "He who is the alone Author and Creator of all things," says the present Bishop of Salisbury, "does not by separate acts of creation give being and life to those creatures which are to be brought forth, but employs His living creatures thus to give effect to His will and pleasure, and as His agents to be the means of communicating life." *

The same language might be applied, without the alteration of a word, to the origin of species, if it were indeed true that new kinds as well as new individuals were created by being born. The truth is, that the argument which has so often been employed to elevate our conception of the wisdom hid in secondary causes, is an argument which only gains increasing strength and force in proportion to the number and involution of those causes, and to the extent and scope of their effects. If it does not diminish, but only augments the wonder of Organic Life, that it has been so contrived as to be capable of propagating itself, neither would it diminish that wonder, but rather enhance it to an infinite degree, that Organisms should be

* Charge, 1867.

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gifted with the still more wonderful power of developing Forms of Life other and higher than their own. So far, therefore, as belief in a Personal Creator is concerned, the difficulties in the way of accepting this hypothesis are not theological. The difficulties are scientific. The first fundamental difficulty is simply this,—that all the theories of Development ascribe to known causes unknown effects—unknown as regards the times in which we now live, and unknown so far as has hitherto been ascertained in all the past times of which there is any record. It is true that this record—the geological record—is imperfect. But, as Sir Roderick Murchison has long ago proved, there are parts of that record which are singularly complete, and in those parts we have the proofs of Creation without any indication of Development. The Silurian rocks, as regards Oceanic Life, are perfect and abundant in the forms they have preserved, yet there are no Fish. The Devonian Age followed, tranquilly, and without a break; and in the Devonian Sea, suddenly, Fish appear—appear in shoals, and in forms of the highest and most perfect type. There is no trace of links or transitional forms between the great class of Mollusca and the great class of Fishes. There is no reason whatever to suppose that such forms, if they had existed, can have been destroyed in deposits which have preserved in wonderful perfection the minutest organisms. So much for the Past.

As regards the Present, Organisms are known to reproduce life, but always life which is like their own. And if this likeness admits of degrees of difference, the margin of variety is not known to be ever broad enough for the foundation of a new species. This, too, is remarkable,—that such margin of variety as does ever exist among the offspring of the same parents becomes smaller and smaller in proportion as we rise in the scale of Organic Life. That any organism, therefore, can ever produce another which varies from itself in any truly specific character, is an assumption not justified by any known fact. No organism is ever seen to exert such a power now. There are many indications which tend to show that all organisms have been equally incapable of modification since the earliest monuments of Man. There is no proof that any organism ever did fulfil such functions at any time. The hypothesis is re-

sorted to because of the difficulty of conceiving any method of creation except creation by birth. But this is no adequate standing-ground for a scientific theory. It would be well for those who speculate upon this subject to remember, that whenever a new species or a new class of animal has begun to be, something must have happened which is not in the "ordinary course of nature," as known to us. Something, therefore, must have happened which we have a difficulty, probably an insuperable difficulty, in conceiving. If, therefore, the theory of Development can be shown to involve difficulties of conception which are quite as great as those which it professes to remove, then it ceases to have any standing-ground at all. An hypothesis which escapes from particular difficulties by encountering others which are smaller, may be tolerated at least provisionally. But an hypothesis which, to avoid an alternative supposed to be inconceivable, adopts another alternative encompassed by many difficulties quite as great, is not entitled even to provisional acceptance. Now, the difficulties attending the theory of Development, or of creation by birth, attain their maximum in the case of Man. Some of them are referred to in a cursory manner by Dr. Whately. Let us examine them a little nearer.

"Man's place in nature" has long been, and still is, the grand battle-ground of anatomists and physiologists; but the points on which they are disagreed among themselves have not really any importance corresponding to the vehemence with which they have been disputed. The great French anatomist, Cuvier, was of opinion that the distinctions between Man's organism and the organism of the highest among the beasts are of such magnitude and importance, that the human race cannot be classified as belonging to the same "Order" with any other creature, but must be held to constitute an "Order" by itself. In our own time Professor Owen holds the same opinion. Professor Huxley, on the other hand, has undertaken to prove that the anatomical differences between the human frame and the frame of the Gorilla, or Chimpanzee, are not such, either in kind or in degree, as to justify this wide distinction. But he specially limits this conclusion to the differences of physiology, and confesses that, if in defining Man we are to take into account the phenomena of Mind, there is between Man and those

beasts which stand nearest to him in anatomy, a difference so wide that it cannot be measured—an "enormous gulf"—"a divergence immeasurable" and "practically infinite." But this last conclusion is really incompatible with the first. There is an inseparable connection between the phenomena of Mind and the phenomena of Organization. They must be taken together, and be interpreted together. The structure of every creature is correlated with the functions which its several parts are fitted to discharge; and the mental character, dispositions, and instincts of the creature are again strictly correlated with these functions. We must accept from anatomists all the facts which anatomy can teach; but the value to be placed on these facts is a very different question. All classification is ideal, and depends on the relative value to be placed on facts which are in themselves indisputable. On this question of the comparative value of anatomical facts we have other facts to go by which do not belong to the science of Physiology. Nature is her own interpreter, and her evidence is clear. Whatever may be the anatomical difference between Man and the Gorilla, that difference is the equivalent, in physical organization, of the whole mental difference between a Gorilla and a Man. This is the measure of value which Nature has set upon the kind and degree of divergence which separates these two Material Forms. Any other measure of value which may be set on that divergence must be founded on an arbitrary and partial selection among the facts of which all sound classification must take account. Imperfect as all existing systems of classification are, they are not so bad in the case of any group of the lower animals as to separate organs from the functions they discharge, and from the mental habits which peculiarities of structure merely represent, embody, and subserve.

Although the resemblances which have been seized upon for the purpose of grouping together a certain number of animals into Classes, or Families, or Orders, have been for the most part resemblances arbitrarily selected, and have borne no consistent reference to any one standard of comparison throughout the creatures to be arranged, yet those resemblances have not been so arbitrary nor so fallacious as to join together in one common "Order" animals separated from each other in powers

and habits by an impassable gulf. Of the eight "Orders" (exclusive of Man) into which Cuvier divided all the animals whose young are suckled (*Mammalia*), one is distinguished from the others by the prehensile character of both feet and hands (*Quadrumana*); another Order is distinguished by the nature of its food (*Carnivora*); the third is distinguished by peculiarities in the production of the young (*Marsupialia*); the fourth and fifth are distinguished by the nature of their teeth (*Rodentia* and *Edentata*); the sixth are distinguished by the texture of their skin (*Pachydermata*); the seventh by peculiarities of the digestive system (*Ruminantia*); and the last by the fish-like form and fish-like habitat of the Whales and Dugongs (*Cetacea*). Now, although it is obvious that no one principle of classification is consistently adhered to in this system,—although there is no common standard to which they are all referred,—yet, as a matter of fact, the peculiarities chosen are not only the most salient and the most characteristic peculiarities of the animals as a whole, but they are connected with others which run through the whole organism, and with some corresponding similarities of instinct and disposition. But no such defence can be offered for the system which groups Man in the same Order with the Chimpanzee or the Ourang-outang, upon the ground merely that the limbs of those animals are terminated by organs which are anatomically "true feet and true hands," or because they have the same number of teeth; or because the same primary divisions exist in the structure of the brain. The difference between the hand of a monkey and the hand of a man may seem small when they are both placed on the dissecting table, but in that difference, whatever it may be, lies the whole difference between an organ limited to the climbing of trees or the plucking of fruit, and an organ which is so correlated with man's inventive genius that by its aid the Earth is weighed, and the distance of the Sun is measured. In like manner let us assume it to be true that the difference between the brain of Man and the brain of the Gorilla may be reduced to a difference of volume, to that visible difference alone, and even as regards volume to a difference in quantity comparatively small. "Cranial capacity" is measured by the cubic inches of space which a skull contains. Professor Huxley tells

us,* on the authority of Professor Schaafhausen, that some Hindu skulls have as small a capacity as 46 cubic inches, whilst the largest Gorilla yet measured contained upwards of 35 cubic inches. This represents a difference of volume of less than 11 cubic inches. But the difference between this Hindu skull and the largest European skull (114 cubic inches) amounts, according to the same authority, to no less than 68 cubic inches. Nevertheless the significance set by the facts of nature upon that difference of 11 cubic inches between the Gorilla and the Man, is the difference between an irrational brute confined to some one climate and to some limited area of the globe,—which no outward conditions can modify or improve,—and a Being equally adapted to the whole habitable world, with powers, however undeveloped, of comparison, of reflection, of judgment, of reason, with a sense of right and wrong,—and with all these capable of accumulated acquisition, and therefore of indefinite advance. It is not true to affirm that these characteristics stand wholly apart—separated by an "enormous gulf"—from his physical organization. There is an adjustment between these peculiarities of Mind and the special peculiarities of his Frame as nice, and as obvious to sense and reason, as there is between the ferocious disposition of a Tiger and his powerful claws, or between the retractile character of these and his soft and stealthy tread.

When anatomists object to erect a separate "Order" for Man on the plea that it is an attempt to reconcile two different orders of ideas,—namely, ideas of anatomical structure, and ideas of mental power,—they are simply refusing to place that value on anatomical differences which nature puts on them. They find no similar difficulty as regards other animals in co-ordinating anatomical structure with mental powers and instincts. The canine teeth of the Carnivora stand in close and consistent relation with their dispositions. The prehensile character of the feet or tail in monkeys is a true and adequate expression of their arboreal habits; and the small and simple brains of the Marsupials (Kangaroos, etc.) are strictly correlated with their low intelligence. We may not—and we do not—understand how these phenomena of Matter and of Mind are thus depen-

* Lyell's "Antiquity of Man," p. 84.

dent on each other; but as a fact we see that this dependence is universal and the distinctions which we found on anatomical structure have their value corroborated and confirmed by close and inseparable correspondences of instinct and intelligence. Man is no exception whatever to this universal law; and any system of classification which places a value on his anatomical peculiarities, separating by an impassable gulf between his Body and his Mind, is a system altogether inconsistent with philosophy. The value set upon any given anatomical peculiarity, or group of peculiarities, in a sound system of classification, ought evidently to correspond as nearly as possible with the value assigned to those peculiarities in the system of nature. The significance of any anatomical feature hinges on the number and variety of other peculiarities to which it stands related. Professor Owen's argument is therefore clearly sound in principle, —that the "consequences" of any such peculiarity must be considered in estimating its systematic value. Take the case of the differences, anatomically small, which distinguish the arms of Man from the arms of a monkey. "The consequences," says Professor Owen, "of the liberation of one pair of limbs from all service in station and progression, due to the extreme modification of the other pair for the exclusive discharge of those functions, are greater and involve a superior number and quality of powers than those resulting from the change of an 'ungulate' (hoofed, one of Cuvier's sub-class divisions) into an 'unguiculate,' or claw-bearing, condition of limb, and they demand therefore an equivalent value in a zoological system."

Accordingly, Professor Owen has attempted to found a system of classification on the degrees of cerebral development, as being the anatomical feature which on the whole stands in the most governing relation to other peculiarities of structure. This proposal has been vehemently contested; but the contest seems to have turned on a point not really vital to the question. Objectors do but aim at proving that all the leading divisions in the brain of Man exist also in the brain of monkeys; and thus, that the difference is reduced to one of volume or quantity alone. But this difference of quantity, relative to the size of the organism, even if no other can be detected by the knife, is correlated with a whole host of other anatomical peculiarities

which span the whole breadth of the chasm that yawns between the brutes and Man. These peculiarities must be taken as a whole, in their assemblage, and in their actual connection. The size of Brain is but the index of many other differences, all closely related to one Purpose, and contributing to one result. It is no answer to this argument to say that an equal amount, or even a greater amount, of difference in mere bulk is found to exist between the lowest and the highest human brain, because the fact with which we have to deal is this, that a certain minimum quantity of that mysterious substance is constantly and uniformly associated with all the other anatomical peculiarities of Man. Below that minimum the whole accompanying structure undergoes far more than a corresponding change,—even the whole change between the lowest Savage and the highest Ape. Above that minimum, all subsequent variations in quantity are accompanied by no changes whatever in physical structure. In placing therefore a high value—a value in classification of Order, or even of Class—upon the eleven cubic inches of brain-space which lie between the Hindu and the Gorilla, when we place no such value on the sixty-eight cubic inches which lie between the Hindu and Sir Isaac Newton, we are but accepting the evidence of Nature—following where she leads, and classifying according to her award.

The bearing of this conclusion on the Origin of Man is simply this, that in proportion as the difference between Man and the lower animals is properly appreciated in the light of nature, in the same proportion will the difficulty increase of conceiving how the chasm could be passed by any process of Transmutation or Development.

This difficulty is still further increased if we advert for a moment to the direction in which the human frame diverges from the structure of the brutes. It diverges in the direction of greater physical helplessness and weakness. That is to say, it is a divergence which of all others it is most impossible to ascribe to mere "Natural Selection." The unclothed and unprotected condition of the human body, its comparative slowness of foot, the absence of teeth adapted for prehension or for defence, the same want of power for similar purposes in the hands and fingers, the bluntness of the sense of smell, such as

to render it useless for the detection of prey which is concealed, —all these are features which stand in strict and harmonious relation to the mental powers of Man. But, apart from these, they would place him at an immense disadvantage in the struggle for existence. This, therefore, is not the direction in which the blind forces of Natural Selection could ever work. The creature "not worthy to be called a man," to whom Sir J. Lubbock has referred as the progenitor of Man, was, *ex hypothesi*, deficient in those mental capacities which now distinguish the lowest of the human race. To exist at all, this creature must have been more animal in its structure; it must have had bodily powers and organs more like those of the beasts. The continual improvement and perfection of these would be the direction of variation most favorable to the continuance of the species. These could not be modified in the direction of greater weakness without inevitable destruction, until first by the gift of reason and of mental capacities of contrivance, there had been established an adequate preparation for the change. The loss of speed or of climbing power which is involved in the forearms becoming useless for locomotion, could not be incurred with safety until the brain was ready to direct a hand. The foot could not be allowed to part with its prone or prehensile character until the powers of reason and reflection had been provided to justify, as it now explains, the erect position and the upward gaze. And so through all the innumerable modifications of form which are the peculiarities of Man, and which stand in indissoluble union with his capacities of thought. The lowest degree of intelligence which is now possessed by the lowest Savage, is not more than enough to compensate him for the weakness of his frame, or to enable him to maintain successfully the struggle for existence. With many Savages it is a hard struggle, despite senses of sight and hearing trained by necessity so as almost to approach the instincts of the lower animals; despite also all those powers of reasoning which, however low, are yet peculiar to himself, and separate him, as is confessed, by an impassable gulf from the highest of the beasts. Many of the Aborigines of Australia could do no more at times than support a precarious existence by scraping up roots, and eating snakes and other reptiles. The rotten blubber of a dead

whale cast upon the beach was, and is often, not only a luxury and a feast, but deliverance from actual starvation. Sir J. Lubbock's theory is, that in these Savages we see something rather above than under the primitive condition of Mankind. But it may be safely said that a very small diminution of mental capacity below that of an Australian Savage, would render Man's characteristic structure incompatible with the maintenance of his existence in most, if not in all, of the countries where he is actually found. If that frame was once more bestial it may have been better adapted for a bestial existence. But it is impossible to conceive how it could ever have emerged from that existence by virtue of Natural Selection. Man must have had human proportions of mind before he could afford to lose bestial proportions of body. If the change in mental power came simultaneously with the change in physical organization, then it was all that we can ever know or understand of a new creation. There is no ground whatever for supposing that ordinary generation has been the agency employed, seeing that no effects similar in kind are ever produced by that agency, so far as is known to us. The theory of Transmutation in all its forms, even as applied to the lower animals, is exposed to many difficulties greater than those which it professes to remove. But as applied to Man, those difficulties are accumulated to an incalculable degree. Most of them, too, are altogether of a special kind, because the divergence which ordinary generation is supposed to have produced in the case of Man is a divergence, to use Professor Huxley's words, "immeasurable—practically infinite."

It needs only to be added to this sketch, that such as Man now is, Man, so far as we yet know, has always been. Two skeletons at least have been found respecting which there is strong ground for believing that they belong to the very earliest human race which lived in Northern Europe. I defer any reference to the probable epoch of time when those skeletons were clothed with flesh and blood. This belongs to the next division of our subject, which is the Antiquity as distinguished from the Origin of Man. Suffice it here to say that although one of those skeletons indicates a coarse, perhaps even what we should call—as we might fairly call some living specimens

of our race—a brutal man, yet even this skeleton is in all its proportions strictly human. Its cranial capacity indicates a volume of brain, and some peculiarities of shape not materially different from many skulls of Savage races now living. The other skeleton, respecting which the evidence of extreme antiquity is the strongest, is not only perfectly human in all its proportions, but its skull has a cranial capacity not inferior to that of many modern Europeans. This most ancient of all known human skulls is so ample in its dimensions that it might have contained the brains of a philosopher. So conclusive is this evidence against any change whatever in the specific characters of Man since the oldest Human Being yet known was born, that Professor Huxley pronounces it to be clearly indicated "that the first traces of the primordial stock whence Man has proceeded need no longer be sought, by those who entertain any form of the doctrine of progressive development, in the newest tertiaries,"—(that is, in the oldest deposit yet known to contain human remains at all.) "But," he adds, "they may be looked for in an epoch more distant from the age of those tertiaries than that is from us." * So far, therefore, the evidence is on the side of the originality of Man as a species, nay, even as a Class by himself, separated by a gulf practically immeasurable from all the creatures that are, or that are known ever to have been, his contemporaries in the world. In possession of this ground, we can wait for such further evidence in favor of Transmutation as may be brought to light. Meanwhile at least we are entitled to remain incredulous, remembering, as Professor Phillips has said, that "everywhere we are required by the hypothesis to look somewhere else; which may fairly be interpreted to signify that the hypothesis everywhere fails in the first and most important step. How is it conceivable that the second stage should be everywhere preserved, but the first nowhere?" †

* Lyell, "Antiquity of Man," p. 89.
† "Life—the Origin and Succession," by Professor John Phillips.

PART III.

THE ANTIQUITY OF MAN.

In passing from the subject of Man's Origin to the subject of his Antiquity, we pass from almost total darkness to a question which is comparatively accessible to reason and open to research. Evidence bearing upon this question may be gathered along several different walks of science, and these are all found tending in one direction, and pointing to one general result. First comes the evidence of History, embracing under that name all literature, whether it professes to record events, or does no more than allude to them in poetry and song. Then comes Archæology, the evidence of Human Monuments, belonging to times or races whose voice, though not silenced, has become inarticulate to us. Piecing on to this evidence, comes that which Geology has recently afforded from human remains associated with the latest physical changes on the surface and in the climates of the globe. Then comes the evidence of Language, founded on the facts of Human Speech, and the laws which regulate its development and growth. And lastly, there is the evidence afforded by the existing physical structure, and the existing geographical distribution of the various Races of Mankind. According as we may have made one or other of these great branches of inquiry our favorite pursuit, we may be disposed to place a different estimate on their comparative value. But perhaps we shall not go far wrong if we arrange them in the order here given as the order in which they stand relatively to the directness and certainty of the testimony they afford.

One distinction, however, it is important to bear in mind. Chronology is of two kinds,—first, Time measurable by years, —and secondly, Time measurable only by an ascertained order or succession of events. The one may be called Time-absolute, the other Time-relative. Now, among all the sciences which

afford us evidence on the Antiquity of Man, one, and one only, gives us any knowledge of Time-absolute; and that is History. From all the others we can gather only the less definite information of Time-relative. They can tell us of nothing more than of the order in which certain events took place. But of the length of interval between those events, neither Archæology, nor Geology, nor Ethnology can tell us anything. Even History, that is, the records of Written Documents, carries us back to times of which no contemporary account remains, and the distance of which in years from any known epoch is, and must be, a matter of conjecture. No other history than the Hebrew History even professes to go back to the Creation of Man, or to give any account of the events which connect existing generations with the first Progenitor of their Race. And of that History, the sole object appears to be, to give in outline the order of such transactions as had a special bearing on Religious Truth, and on the course of Spiritual Belief. The intimations given in the earlier chapters of the Book of Genesis on all matters of purely secular interest, are incidental only, and exceedingly obscure. And yet it is not a total silence. Enough is said to indicate how much there lay beyond and outside of the narrative which is given. The dividing of the tribes of the Gentiles among the descendants of Japheth,* conveys the idea of movements and operations which probably occupied long intervals of time, and many generations of men. The same impression must arise from the condensed abstract given of the origin and growth of communities capable of building such cities as Resen and Calah and Nineveh are described to be.† In the genealogy of the family of Shem, we have a list of names, which are names and nothing more to us. It is a genealogy which neither does, nor professes to do, more than to trace the order of succession among a few families only out of the millions then already existing in the world. Nothing but this order of succession is given, nor is it at all certain that this order is consecutive or complete. Nothing is told us of all that lay behind that curtain of thick darkness, in front of which these names are made to pass. And yet there are, as it were, momentary liftings, through which we have glimpses of great movements which were going on, and had long been going on,

* Gen. x. 2, 5. † Gen. x. 11, 12.

beyond. No shapes are distinctly seen. Even the direction of those movements can be only guessed. But voices are heard which are as the voices of many nations. The very first among the descendants of Noah whose individuality and personality is clear to us,—the very first whose doings can be brought into relation with events otherwise known or recognizable in the History of Man,—is introduced in a manner which reveals the fact that different races of the human family had then already been long established and widely spread. The memorable and mysterious journey which brought Terah into Haran on his way to Canaan,* was a journey beginning in that ancient home, Ur, already known as "of the Chaldees." And when the great figure of his son Abraham appears upon the scene, we find ourselves already in the presence of the Monarchy of Egypt, and of the advanced civilization of the Pharaohs. In the same narrative, on another side, we come into the presence of one of those great military Kingdoms of the East which in succession occupy so large a space in the history of the ancient world. Chedorlaomer, with his tributary Princes, was then the ruler of nations capable of waging wars of conquest at great distances from the seat of their government, and the centre of their power. We see in him therefore the Sovereign of a long-established and powerful race. And yet these migrations and wars of Abraham stand, if not at the very beginning of History, at least at the very beginning of Historical Chronology. They mark the very earliest date in the history of Man, on which, within moderate limits of discrepancy, all chronologists are agreed. That date may be fixed at 2000 B.C. This is the boundary, in looking backwards, of Time-absolute. All beyond, is Time-relative.

We have, indeed, other evidence of an historical character to show that the Monarchy of Egypt had been founded long before the time of Abraham. But how long, is a question on which there is the widest discrepancy of opinion. The most moderate computation, however, carries the foundation of that Monarchy as far back as 700 years before the visit of the Hebrew Patriarch. Some of the best German scholars hold that there is evidence of a much longer chronology. But seven centuries before Abraham is the estimate of Mr. R. Stuart

* Gen. xi. 31.

Poole, of the British Museum, who is one of the very highest authorities, and certainly the most cautious, upon questions of Egyptian chronology. This places the beginning of the Pharaohs in the twenty-eighth century B.C. But according to Ussher's interpretation of the Hebrew Pentateuch, the twenty-eighth century B.C. would be some 400 years before the Flood. On the other hand, a difference of 800 years is allowed by the chronology which is founded on the Septuagint Version of the Scriptures. But the fact of this difference tells in two ways. A margin of variation amounting to eight centuries between two versions of the same document, is a variation so enormous, that it seems to cast complete doubt on the whole system of interpretation on which such computations of time are based. And yet it is more than questionable whether it is possible to reconcile the known order of events with even this larger estimate of the number of years. It is true that, according to this larger estimate, the Flood would be carried back about four and a half centuries beyond the beginning of the Pharaohs. But is this enough? The founding of a Monarchy is not the beginning of a race. The people amongst whom such Monarchies arose must have grown and gathered during many generations. Nor is it in regard to the peopling of Egypt alone that this difficulty meets us in the face. The existence in the days of Abraham of such an organized government as that of Chedorlaomer, shows that 2000 years B.C. there flourished in Elam, beyond Mesopotamia, a nation which even now would be ranked among "the Great Powers." And if nations so great had thus arisen, altogether unnoticed in the Hebrew narrative —if we are left to gather as best we may from other sources, all our knowledge of their origin and growth, how much more is this true of far distant lands over which the advancing tide of human population had rolled, or was then rolling its mysterious wave? If the most ancient and the most sacred literature in the world tells us so little of the early history of the men who lived and flourished on the banks of the Euphrates, the Tigris, or the Nile, what information can we expect to find in it respecting those who were probably already settled on the Indus and the Ganges, or were spreading along the banks of the Brahmaputra and of the Yellow River? What of those

tribes who were following the Volga and the Oxus, or the Danube and the Rhine? What of that vast Continent whose secrets are being revealed at last only in our own day—the Continent of Africa? When and how did that Negro Race begin, which is both one of the most ancient and one of the most strongly marked among the varieties of Man? And what again can we learn from Genesis of the peopling of the New World? When did Man first come upon the island seas of America, and follow the great rivers which fall into the Gulf of Mexico?

It is not possible to suppose that some 450 years before the foundation of the Egyptian Monarchy is a period long enough to account even for the few facts which are implied in the Mosaic narrative itself, respecting the dispersion and geographical distribution of Mankind. And to those facts must be added others resting on evidence which is still historical. There is another civilization which appears to have been almost as ancient as that of Egypt, and which has been far more enduring. The authentic records of the Chinese Empire are said to begin in the twenty-fourth century B.C.—that is, more than 300 years before the time of Abraham.* They begin, too, apparently with a Kingdom already established, with a capital city, and with a settled government.† Yet this civilization first appears at the farthest extremity of Asia, separated by many thousands of miles, and by some of the most impassable regions of the world, from the cradle of the Human Race, and from the country where Noah and his family were saved. Such facts seem to point to one or other of two conclusions—either that the Flood must have happened at a period in the history of Man vastly earlier than any that has been usually supposed, or else that the Flood destroyed only a small portion of the Human Family. That the Deluge affected only a small

* "The Chinese;" G. T. T. Meadows, p. 34.

† Since this passage was published I have been favored with an interesting letter from the Rev. James Legge, who has spent many years as a missionary in China, and has published valuable editions of the Historical works of the Chinese. It is this gentleman's opinion that the Chinese Tribe was only beginning to grow into a kingdom about 2000 B.C. and, that 1200 years later, the kingdom did not extend nearly so far south as the Yang-tsze river. The general conclusion to which these dates point, is not, I think, materially affected by this somewhat shortened estimate of Chinese Historical Chronology.

portion of the globe which is *now habitable* is almost certain. But this is quite a different thing from supposing that the Flood affected only a small portion of the world which was *then inhabited.* The wide, if not the universal prevalence among the heathen nations, of a tradition preserving the memory of some such great catastrophe, has always been considered to indicate recollection carried by descent from the surviving few. And this tradition seems to be curiously strong and definite among tribes which are now separated by half the circumference of the globe from the region affected by the Flood. At all events this is clear, that the difficulty of reconciling the narrative of Genesis with an indefinitely older date is a very small difficulty indeed, as compared with the difficulty of reconciling it with a very limited destruction of the Human Race. The evidence for a higher antiquity of Man is derived from countries in comparatively close proximity with those which, under any possible supposition as to the area of a Deluge, must have been then submerged. On the other hand, we have seen how utterly uncertain and how enormously different are the chronologies which profess to be founded on the Pentateuch. They all involve suppositions as to the principle of interpretation, and as to the import of words descriptive of descent, which are in the highest degree doubtful, and which it is evident cannot be applied consistently throughout. Thus, when we read * of Canaan, the grandson of Noah, that he "begat Sidon, his first-born, and Heth," we seem to have the names of individual men; but, when it is immediately added that he also "begat the Jebusite, and the Amorite, and the Girgasite, and the Hivite, and the Arkite, and the Sinite," etc. etc., it is clear that we are dealing not with single generations, but with a condensed abstract of the origin and growth of Tribes. No definite information is given in such abstracts as to the lapse of time. The chronology of changes not specially included in the narrative, can only be gathered from the general character of the events described. And that general character is such as to fully corroborate the evidence we have from other sources—that long before the Call of Abraham, that is to say, long before the twentieth century B.C., the Human Race

* Gen. x. 15-18.

had been increasing and multiplying on the earth from such ancient days that in many regions, far removed from the centre of their dispersion, great nations had arisen, powerful and civilized governments had been established.

So far, then, we have the light of History shining with comparative clearness over a period of 2000 years before the Christian era. Beyond that we have a twilight tract of time which may be roughly estimated at 700 years—a period of time lying in the dawn of History, at the very beginning of which we can dimly see that there were already Kings and Princes on the earth. But this is the outer margin of Time-absolute. No farther, with even an approximation to the truth, can we measure the order of events by the lapse of years.

But there is a point at which the evidence of Archæology begins before the evidence of History has closed. There is a border-land where both kinds of evidence are found together, or rather, where some testimony exists of which it is difficult to say whether it is the testimony of written documents or of the inarticulate monuments of Man. It was the habit of one of the most ancient nations in the world to record all events in the form of pictorial representation. Their domestic habits, their foreign wars, their religious beliefs, are thus all presented to the eye. And one of the questions on which this testimony bears is a question of paramount importance in determining the antiquity of the Human Family. That question is not the rise of Kingdoms, but the origin of Races. The varieties of Man are a great mystery. The physical differences which these varieties involve may be indeed, and often are, much exaggerated. Yet, these differences are distinct, and we are naturally impelled to ask When and How did they begin? These are two separate questions; but the one bears upon the other. The question When stands before the question How. The fundamental problem to be solved is this: Can such varieties have descended from a single stock? And if they can, then must not a vast and indefinite lapse of time have been occupied in the gradual development of divergent types? On this question we have no datum on which to reason, unless we can ascertain how far back in Time-absolute these divergences had already become established. Now, this is the datum which Egypt gives

us. In one of the most perfect of the paintings which have been preserved to us, a great Egyptian monarch is symbolically represented as ruling with the power of life and death over subject races: and these are depicted with accurate and characteristic likeness. Conspicuous in this group is one figure, painted to the life both in form and color, which proves that the race which departs most widely from the European type, had then acquired exactly the same characters which mark it in the present day. The Negro kneels at the feet of Sethos I., in the same attitude of bondage and submission which typifies only too faithfully the enduring servitude of his race. The blackness of color, the woolliness of hair, the flatness of nose, the projection of the lips, which are so familiar to us,—all these had been fully established and developed thus early in the known history of the world. And this was about 1400 years before the Christian era—that is to say, more than 3200 years ago. I am informed by Professor Lepsius (through the kindness of Mr. Poole) that there are some still earlier representations of the Negro—referable to the "Twelfth Dynasty," or to about 1900 B.C. In these it is curious that the Negro color is strongly marked, but not the Negro feature. This, however, may be due to the unskilfulness of early art, or to the fact, too often forgotten, that some African tribes—as, for example, the Nubians—have not the low flat nose or the projecting lips. Nor is this the whole evidence afforded by the Egyptian pictures. At periods not much later in the history, we have elaborate representations of battles with Negro nations,—representations which go far to show that the race was then more able to maintain a contest with other races than it has ever been in recent times. And of this a further proof is to be found in the fact, that at a period at least 2000 years B.C.—that is about the time of Abraham—mention is made in hieroglyphic writings of Black or Negro troops being raised by an Egyptian king, to assist him in the prosecution of a great war.*

Since, then, the Negro race was already, in the days of Abraham, just what it is now, what is the time we must allow for the

* Drawings by the skilful hand of Mr. Bonomi are given on p. 33 and p. 34 in illustration of the facts stated in the text. They are taken from an Egyptian temple at Beyt-el-Welee, in Nubia, of the reign of Rameses II., son and successor of Sethos I.

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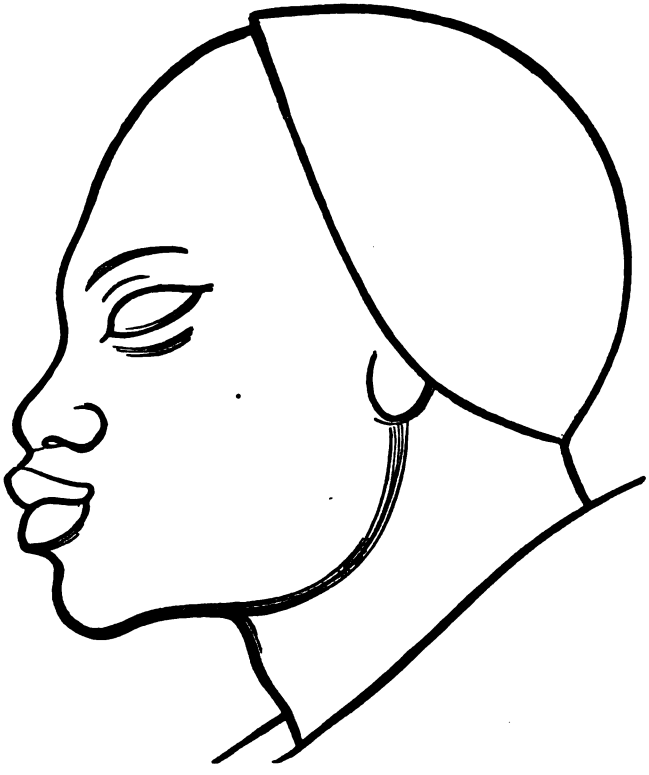
development of this variety of Man, supposing it to have descended from a common stock? We have absolutely no measurement of time by which to estimate the growth of such varieties. We know that changes of climate and of food do produce upon Mankind some modifications of color, and of features. But we know also that such changes are extremely slow. Color



is in all the lower animals one of the least constant—that is to say, one of the most variable,—of external characters; and under circumstances of domestication changes of color are sometimes sudden, and are connected with causes altogether unknown. But we have no evidence to show that human color is liable to changes of a like kind. On the contrary, all expe-

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rience seems to point to the conclusion that varieties of complexion can only be established very gradually, and we have no absolute proof that a change from white to negro blackness is possible at all. A very able and ingenious writer, whose work is unfortunately anonymous,* but whose opinions are endorsed by the high authority of Mr. Poole, has assumed that this change is not within the compass of any natural causes, and cannot be accounted for by any lapse of time. On this as well as on other grounds he adopts the theory that Adam was the progenitor of the white races only; and that before the creation of Adam, the Black Race had been established in the Continent of Africa. He maintains that in the Mosaic narrative, contrary to the usually interpretation, there are clear indications of the existence of pre-Adamite races. This theory undoubtedly explains one passage in Genesis, which seems otherwise wholly unintelligible, namely, that in which mention is made of unions between the "Sons of God" and the daughters of men. Our author affirms that for the "Sons of God" we ought to substitute as the true meaning in the original, "the servants of the gods," or in other words the idolatrous races of the world. In like manner the daughters of men should be translated, "the daughters of the Adamite." The passage would thus refer to intermarriages between the children of Adam and the pre-existing idolatrous nations of the world. It is true also that this theory would remove or diminish some other difficulties attending the received interpretation. But on the other hand the Unity of Mankind is so deeply interwoven with the fundamental doctrines of Christianity, as hitherto universally understood, that the new difficulties raised are far greater than those which would be thus removed. No doubt it may be said that the Unity of Mankind as a species, does not necessarily depend upon descent from a single pair; and it is true that this Unity is a matter of fact which cannot under any hypothesis be denied; because we know that the barrier of hybrid barrenness which nature sets against the mixture of different species does not impede the amalgamation of even the most diverse varieties of Man. It is therefore certain that in this sense, which involves the full possession of a common nature, "God hath

* "Genesis of the Earth and of Man."

made of one blood all nations of men for to dwell on all the face of the earth." It is of course conceivable that this full community of nature may have been given by the Creator to two or more original pairs. But all the evidence of science tends to the conclusion that each well-marked species has spread from some one centre of creation, and presumably from a single pair. There is no clashing between this evidence and the testimony of Revelation as that testimony has hitherto been interpreted. Strongly marked as the varieties of Man now are, the variation is strongest in respect to color, which in all organisms is notoriously the most liable to modification and to change. And in this feature of color it is remarkable that we have every possible variety of tint from the fairest to the blackest races, so that the one extreme passes into the other by small and insensible gradations. As regards structure, the differences between different varieties of Man are comparatively trifling, and it may safely be affirmed that all the efforts of anatomists and physiologists who have been most determined to magnify every point of variation, have utterly failed to render it impossible or improbable that all men have had a common ancestor. But in exact proportion as we hold to this conclusion as the only satisfactory explanation of the Unity of Man, must we be prepared to accept the high probability, if not the certainty, of the very great antiquity of the Race.

Next comes the science of Language, of which those who have made it a special study affirm, that it affords the most conclusive evidence of all, that the articulate voice of Man has been sounding in the world during vast though indefinite periods of time. "The evidence of language," says Professor Max Müller, "is irrefragable, and it is the only evidence worth listening to with regard to ante-historical periods." And what does this evidence go to prove? Let us take one example. "There was a time," says the same author, "when the ancestors of the Celts, the Germans, the Slavonians, the Greeks, and Italians, the Persians and Hindus, were living together beneath the same roof—separate from the ancestors of the Semitic (Hebrew) and Turanian races." * The principle on which the evidence of language is interpreted is very simple.

* "Chips from a German Workshop," vol. i. pp. 63, 64.

The sounds or words by which men designate things are for the most part arbitrary, and therefore conventional. The sign and the thing signified have no natural or necessary connection. The names of a very few animals may be imitations of their voice. No argument, for example, could be founded on the word Cuckoo being used by the most diverse tribes to designate a bird which sounds these two syllables in its cry. But such cases are very rare even in the names of beasts. Wherever the same thing is denoted by the same word, and where there is no natural connection between them, there must have been once a common understanding amongst men who dwelt together, as to the meaning of that sound. And when this common understanding is found to affect the nearest relationships of life, and the animals domesticated in primeval times, the evidence of ancient consanguinity is complete. In this case "the terms for God, for house, for father, mother, son, daughter, for dog and cow, for heart and tears, for axe and tree, identical in all the Indo Germanic words, are like the watchwords of soldiers." But when was it that the fathers of nations now so far apart as Germans and Hindus were living together under one roof? This is a question which, in the terms of Time-absolute, no man can answer. Only we know that before the time of Abraham the languages of those great leading stocks must have been nearly as far apart as they are now. Professor Max Müller is of opinion that to the Hymns of the Vedas a later date cannot be assigned than 1200 B.C. Homer and Hesiod are in all probability referable to a later date, but not so much later as to cast any doubt on the conclusion that both Greek and Sanskrit were then perfectly developed. Those who have studied the growth of languages, and the mysterious laws by which that growth is regulated, are lost in conjecture as to the lapse of time which may probably have been required to account for the wonderful creations of Human Speech.

Next comes the evidence of Geology, which only in very recent years has been found to speak with any distinctness upon the question of Man's Antiquity. Not that there is any change in the general bearing of that evidence as it stood before. There is *none* whatever. The evidence of Geology has always

been, that among all the creatures which have in succession been formed to live upon this earth, and to enjoy it, Man is the latest born. This great fact is still the fundamental truth in the History of Creation: that history, as Geology has revealed it, has been a history of successive Creations, and of successive Destructions,—Old Forms of Life perishing, and New Forms appearing, so that the whole face of nature has been many times renewed. But until very lately it was supposed that these vast cycles of change had been finally completed before Man appeared. And as regards fresh creations this supposition is still supported by the testimony of science. So far as we yet know, no New Form of Life has been created since the Highest Form was made. But it now appears that since that event many Old Forms have died. The Cycles of Creation had closed, but not the Cycles of Destruction. Of itself, it might be supposed that this fact has little bearing upon the question of Time. The extinction of some noxious animals in particular parts of the globe, as for example in our own country, has taken place within the period of history, and some few species of wingless birds, as the Dodo and the Great Auk, have been destroyed in very recent times. But these have been extinctions effected through the agency of Man. What is now proved is that a whole group or fauna of great quadrupeds have utterly perished since Man appeared. And the causes of this destruction seem to have been of the same kind as the causes which in all former ages had produced similar results—viz., great changes in the climates of the globe, and great movements affecting the configuration of its surface. In these last circumstances lies the real stress of the evidence derived from the new discoveries. It is conceivable that old kinds of Elephant and Rhinoceros may have roamed over Northern Europe when its surface and its climate were the same as they now are. It is less probable that the small streams which now exist in England should have harbored herds of Hippopotami. But the position in which the remains of these great animals are found indicates that since they flourished there have been considerable changes in physical geography. It indicates, too, that a great change of climate has accompanied certain changes in the configuration of land and sea. I know no

better example of the evidence to this effect than one which is very easily accessible in our own country. We have only to go down to the pleasant shores of Devon, and to one of the pleasantest spots upon those shores—the south-western promontory of Torbay. Overhanging the little harbor of Brixham, where two hundred years ago William of Orange landed, there is a steep limestone hill, at the foot and on the face of which the houses of the town are built. Close to the summit a few years ago a cavernous hollow was discovered. It extends a considerable distance through the limestone rocks, and no one who goes through it can fail to see that it has once been the bed of a stream. The smooth surfaces worn by the long action of running water are perfectly preserved, and the rounded pebbles which were found in the bed of this ancient stream are additional evidences of the fact. Now let any one stand at the entrance, or at the exit of this cavern and cast his eye on the surrounding landscape. Whence can this stream have flowed, and whither? The hill is now separated from all higher ground by valleys which are at least sixty feet below the level of the cave. It is evident at a glance that the whole physical geography of the country must have been different, when running water channelled this limestone hill. Yet in this cave the works of Man, flint arrow-heads and knives, were found, along with the bones of the Elephant, the Rhinoceros, the Bear, the Hyæna, and the Reindeer. As regards one of these animals, the whole leg was found together, showing that the bones had been covered with flesh when they were carried by the stream. This is only one case out of very many which have now been discovered in various parts of Europe.

I need not here go farther into detail as regards this kind of evidence. Suffice it to say, that all the facts tend to these three general conclusions: 1st, that Man appeared in Northern Europe at a time when it was covered with great quadrupeds now wholly extinct; 2d, that the surface of the Earth has since that period been subjected to modifications, which imply great changes in physical geography; and 3d, that the period when those animals flourished, and when Man co-existed with them, was one when a colder climate prevailed. Now no one conclusion of geological science is more firmly established than this,

that there was a time, comparatively very recent, when an Arctic climate prevailed far down into latitudes which are now temperate; and when a great part of Northern Europe and of our own islands was submerged under a Glacial Sea. This sea was ploughed by floating icebergs, which as they melted dropped their rocks and boulders upon the bottom. That bottom has since been raised again into dry land, and these boulders now interrupt the drainer in cultivated fields, and strew the surface of our wildest moors. Many concurring indications go far to prove that it was when this Glacial Period had nearly passed away, when a milder climate was beginning to prevail over the land which we now know, that Man also began to find his way into Northern Europe. There he sought his living among herds of animals, of which the greater number are now extinct and a few remain only in those regions which are still Arctic. This is the order of events as we can read it with tolerable certainty in the language of Time-relative. But we have little means of knowing what relation this order of events bears to Time-absolute. It is still disputed among Geologists how far the causes of geological change were once more intense in their action than they are now. It is quite certain that during the passing away of a glacial climate, the cutting power of rivers must have been intensified by the increasing rapidity with which ice and snows were melted. There are also facts connected with the position in which remains of the extinct animals are often found, which cannot, in my opinion, be explained, except by violent and sudden action since or during the period of their entombment. Great caves, packed closely from floor to roof with the bones of the Hippopotamus and Rhinoceros; other caves, equally full of the bones of extinct Oxen, are proofs of some diluvial action of which Man has had no experience in historic times. But, even allowing for the greater activity of geological causes, the time required for such changes of climate has in all probability been very great. And when we consider that many of these evidences of Geology apply to the New World as well as to the Old, we cannot fail to see that the proofs of a very high antiquity for the Human Race are proofs of a cumulative character, gathered along several different paths of investigation, and all tending to one general result.

That result, however, is necessarily indefinite, and cannot be expressed in years. Of the evidence from the dispersion of the Human Race, it may be fairly said that we do not know how rapidly Man may have spread when the beasts of the chase were yet unacquainted with his destructive powers, when they probably swarmed in innumerable herds, and when from their tameness they must have fallen an easy prey. Of the evidence from Language it may again be said that we do not know how rapidly the forms of human speech may have altered among tribes wandering and unsettled, rapidly changing place, and as rapidly accommodating themselves to new scenes and new necessities. In like manner, of the evidence from Geology it may be said that we do not know how rapidly changes of climate may have been effected if the agencies which determine the distribution of Sea and Land were more active than they have been in historic times. All these are pleas in mitigation of extreme demands in point of time, and they are pleas which may be fairly urged. But when all due allowance has been made for the considerations to which they point, there remains a weight and concurrence of authority in favor of a long chronology which grows and increases in the minds of all who have studied each one of the separate branches of inquiry.

For my own part I see no reason to be jealous of the conclusions of science in this matter. The question is, after all, a small one. It is a question of a few thousand years more or less; and thousands of years are as less than seconds in the Creative Days. The estimates of Time which have been given us by Geology have been compared with the estimates of Space given us by Astronomy. But there is an important difference. There is no visible limit to Astronomical Space. The apparent magnitude of the largest of the Heavenly Bodies shows that millions of miles are quantities inappreciable even to our eyes, and that worlds are scattered like dust through illimitable depths. But it is not so with Geological Time. Its periods are indeed very long, but the beginning of them can be seen. It is not a boundless ocean, it is only a very broad sea. On the other side of it there rise the mountains of a Lifeless Land. Successive creations mark the distance between us and them, and although we cannot say what that distance is, we can say

that it is a finite distance—that beyond a boundary which we can see, the world was not a world such as we now live in, but a world comparatively "without form and void." The question of Man's Antiquity involves no attempt to measure the breadth of this great space, but only the breadth of a little bay or creek, close to the shores on which we are now standing. Be this breadth greater or smaller by one, two, or three, or four, or five, or ten thousand years, its *relative* place in the great Tracts of Creative Time undergoes no change whatever. Man is the latest work. Recent discoveries have thrown no doubt on this, but, on the contrary, have all tended to confirm it. I know of no one moral or religious truth which depends on a short estimate of Man's antiquity. On the contrary, a high estimate of that antiquity is of great value in its bearing upon another question much more important than the question of time can ever be—viz., the question of the Unity of the Human Race. We must indeed be very cautious in identifying the interests of Religion with any interpretation (however certain we may have hitherto assumed it to be) of the language of Scripture upon subjects which are accessible to scientific research. We know from past experience how foolish and how futile it is to do so. But unquestionably the Unity of the Human Race, in respect to origin, is not easily separated from some principles which are of high value in our understanding both of moral duty and of religious truth. And precisely in proportion as we value our belief in that Unity ought we to be ready and willing to accept any evidence on the question of Man's Antiquity. The older the Human Family can be proved to be, the more possible and probable it is that it has descended from a single pair. My own firm belief is that all scientific evidence is in favor of this conclusion, and I regard all new proofs of the Antiquity of Man as tending to establish it on a firmer basis.

PART IV.

MAN'S PRIMITIVE CONDITION.

As the question of Man's Origin is different from the question of his Antiquity, and as the Antiquity of Man is a different question from his Primitive Condition, so again the last question includes within itself several different matters of inquiry. There is first the question, What consciousness had Primeval Man of Moral Obligation, and what communion with his Creator? Next there is the question, What were his innate powers of Intellect or Understanding? And, thirdly, there is the question, What was his condition in respect to Knowledge, whether as the result of intuition, or as the result of teaching? It is a fatal fault in the discussion of this subject, as conducted both by Archbishop Whately and by Sir J. Lubbock, that these distinctions are either not seen or not distinctly kept in view. Perhaps, indeed, it may be thought that the Savage-theory is independent of such close analysis. But this is by no means the case. The distinction between the possession of Faculties capable of acquiring knowledge, and the possession of knowledge, actually acquired, is a fundamental distinction. Not less fundamental is the distinction between a creature who is morally good but intellectually uninformed, and a creature who is both ignorant and vicious. Sir J. Lubbock speaks of Primeval Man as having been in a condition of "utter barbarism." But no one, speaking philosophically, has a right to use such terms as "barbarism" and "civilization" without some definition of their meaning. What were those Faculties which made the first creature who possessed them "worthy to be called a Man?" A Mind capable of reason, disposed to reason, and able to acquire, to accumulate, and to transmit knowledge,—this is the distinctive attribute of Man. The first Being "worthy to be so called," must have had such a mind. But it could not properly be said of such a Being, on the ground merely of his ignorance of mechanical arts, that he was in a condition of "utter barbar-

ism," if he were at the same time conscious of moral obligations and obedient to them. It is, of course, open to a theorist to assume that the First Man was both ignorant and bad, or that the sense of right and wrong was rudimentary and wholly uninformed. But all I desire to point out here is, that there is no necessary connection between a state of mere childhood in respect to knowledge, and a state of "utter barbarism"—words which, if they have any definite meaning at all, imply the lowest moral, as well as the lowest intellectual condition. Consequently no proof, if proof there be, that Primeval Man was ignorant of the industrial arts can afford the smallest presumption that he was also ignorant of duty or ignorant of God. This is a fundamental objection to the whole scope of Sir J. Lubbock's argument. It interposes an impassable gulf between his premises and his conclusion.

But there is another objection equally fundamental. Traces or remains of barbarism, properly so called, that is, traces of customs savage or immoral, in the usages of civilized nations, may be an indication of the fact that those nations, or the races from which they sprang, have passed through a stage of barbarism. But it affords no presumption whatever that barbarism was the Primeval Condition of Man, any more than the traces of Feudalism in the laws of modern Europe prove that feudal principles were born with the Human Race. All such customs may have been, and as many think, probably have been not Primeval but Medieval, that is to say, the result of time and of development, and that development a development of corruption. To assume that they were original, or that they were even better or less barbarous than others which preceded them, is to assume the whole question in dispute. Yet this assumption runs through all Sir J. Lubbock's arguments. Wherever a brutal or savage custom prevails it is at once assumed to be a sample of the original condition of Mankind. And this in the teeth of facts which prove that many of such customs not only may have been, but must have been, the result of corruption. Take cannibalism as one of these. Sir J. Lubbock seems to admit that this loathsome practice was not primeval, probably because he considers it as unnatural.* And so it is,—that is

* "Prehistoric Times," p. 371.

to say, it is against the better nature of Man; but the fact of its existence proves that within the limits of that nature there are elements liable to perversions even so horrible as this. And so we come upon the fact of the two natures of Man, and of the power of the worst parts of his nature to overcome the best. It is thus that customs the most cruel and depraved become established. But if this be the explanation, and the only possible explanation, of cannibalism, is it not evident that this may also be the explanation of other customs which are violent and horrible only in a less degree?—Cruel rites of worship, and savage customs as regards marriage and the relation of the sexes, come under the same category.* Cannibalism is only an extreme case of a general law, and it is a crucial test of the fallacy of a whole class of arguments commonly assumed by those who support the Savage-theory respecting the Primeval Condition of Mankind.

On the other hand, I think it cannot be denied that the argument of Whately is equally defective in failing to recognize the essential distinctions to which I have referred. His assertion, repeated over and over again, is that mere savages "never did and never could raise themselves, unaided, into a higher condition." Now it may be perfectly true that Man never could "unaided" discover religious truth, or rise to any adequate idea of the nature, or of the demands, of moral obligation; and yet it may be wholly untrue that he is equally incompetent to discover the physical laws of nature, or to find out by mechanical skill how to adapt them to his own use. Again, Whately admits, that "when men have once reached a certain stage in the advance towards civilization, it is then possible for them (under favorable circumstances) to advance further and further in the same direction." But there is no attempt to define either what civilization in this sense means, or to specify what kind and what amount of preliminary instruction is the minimum from which further advance is rendered possible. If by civilization is meant a knowledge of the industrial arts, the doctrine that Man never did and never could "unaided" raise himself from

* Much stress is laid on these by Sir J. Lubbock. Yet many of the customs he refers to, such as Bride-catching, although they may have arisen in very early times, cannot possibly have been Primeval in the strict sense of that term.

one step in mechanical invention to another, is a doctrine involving two separate assertions which require to be separately examined. Of these two assertions, the first, that Savages never have "raised themselves," is an assertion which, from its very nature, it is difficult if not impossible to prove. Whately defies the supporter of Development to produce a single case where this has been actually done. Sir J. Lubbock replies by defying his opponent to show that it has not been done and done often. He urges, and urges as it seems to me with truth, that the great difficulty of teaching many savages the arts of civilized life, is no proof whatever that the various degrees of advance towards the knowledge of those arts which are actually found among semi-barbarous nations, may not have been of strictly indigenous growth. Thus it appears that one tribe of Red Indians, called "Mandans," practised the art of fortifying their towns. Surrounding tribes, although they saw the advantages derived from this art, yet never practised it, and never learned it. Whately, fixing his eyes on the ruder tribes, says, "See how clear it is that savages are utterly unteachable." His opponents, fixing their eyes on the more advanced tribes, say, "See how clear it is that men once savage can invent and practise useful arts." Whately says, "Prove to me, first, that these Mandans had ever been as savage as their neighbors, and secondly, that they had raised themselves." Sir J. Lubbock replies that on the conditions laid down by Whately no such proof is possible. If any record could be found of the former condition of the Mandans, the very existence of such a record would prove former contact with civilized peoples, and if such contact were proved, Whately would attribute to such contact the improvement which is observed. On the other hand, if the Mandans had "raised themselves" from a more savage condition, without any teaching from more civilized races, there could be no record of the fact. The same objection applies to the demand made by Whately as regards all other races among whom different mechanical arts have been found established. It is impossible by counter assertions to settle dogmatically the origin of such arts, and the absence of recorded cases of indigenous advance is itself rather favorable than adverse to the theory of those who assert that such advance

is possible, and has actually taken place. It is precisely when this advance has been most strictly indigenous that the preservation of the fact by record would become impossible.

I do not agree, therefore, with the late Archbishop of Dublin, that we are entitled to assume it as a fact that, as regards the mechanical arts, no savage race has ever raised itself. The other assertion that no such race ever could so raise itself, is confessedly a theory, and a theory the truth of which is by no means self-evident. In the first place, when the possibility of progress is admitted, provided some elementary instruction is supposed as a foundation on which to work, it is evident that we are dealing with a proposition altogether hazy, unless there be some clear definition of the nature and amount of this elementary instruction which is demanded. Whately says that "the earliest generations of mankind had received only very limited, and what may be called elementary instruction, enough merely to enable them to make further advances afterwards by the exercise of their natural powers." But how much was this "enough?" And what is meant by "instruction," as distinguished from inborn or intuitive powers of observation and of reasoning? May not this have been the form in which the Creator first "instructed" Man? For here it is important to observe that indirect proportion as we assume Man's Primitive Condition to have been such as to require elementary teaching, in the same proportion do we suppose that his primitive condition in respect to intellect was low and weak. Accordingly, Whately assumes as an indisputable fact, that Man has no instincts such as enable the lower animals to construct nests, and cells, and lairs. My own belief is, that this is an assumption which is not only unproved, but one which in all probability is false. As Whately himself admits, "Man is an animal" as well as the creatures that are below him. It is true that he has not instincts of the same kind as they have. But this is no proof whatever that he has not, and had not originally, instincts which stand in strict correlation with the peculiarities of his higher physical organization. This is a department of inquiry which has been far too much neglected both by physiologists and by metaphysicians. There are many facts which go far to prove that Man has, and must always have had, instincts which

afford all that is required as a starting-ground for advance in the mechanical arts. Few persons have reflected on how much is involved in the most purely instinctive acts, such as the throwing of a stone, or the wielding of a stick as a weapon of offence. Both these simple acts involve the great principle of the use of artificial tools. Even in the most rudimentary form, the use of an implement fashioned for a special purpose is absolutely peculiar to Man, and arises necessarily and instinctively out of the structure of his body. The bodies of the lower animals are so constructed that such implements as they are capable of directing are all supplied in the form of bodily organs. All effects which they desire to produce, or are capable of producing, are effected directly by the use of those organs under the guidance of implanted instincts. There are some very curious cases among the lower animals of a near approach to the principle involved in the use of tools—that is to say, the use of natural force through artificial means. Thus the common Gray or Hooded Crow is constantly in the habit of lifting shell-fish to a certain height in the air, and then letting them fall upon the rocks of the shore, in order to break the shells. Some species of Monkey will even use any stone which may be at hand for the purpose of striking and breaking a nut. The Elephant tears branches from the trees and uses them as an artificial tail to fan himself and to keep off the flies. But between these rudiments of intellectual perception and the next step—that of adapting and fashioning an instrument for a particular purpose, —there is a gulf in which lies the whole immeasurable distance between Man and the brutes. In no case whatever do they ever use an implement made by themselves as an intermediate agency between their bodily organs and the work which they desire to do. Man, on the contrary, is so constructed that in almost everything he desires to do he must employ an agency intermediate between his bodily organs and the effect which he wishes to produce. But this necessity, which in one aspect is a physical disability, is correlated with a mind capable of Invention, and with certain implanted instincts which involve all the rudiments of mechanical skill. The man who first lifted a stone and threw it, practised an art which not one of the lower animals is capable of practising. This is an act which in all

probability, is as strictly instinctive and natural to Man as it is to a Dog to bite, or to a Bull to charge. Yet the act involves the idea and the knowledge of projectile force, and of the arts by which direction can be given to that force. The wielding of a stick is, in all probability, an act equally of primitive intuition, and from this to the throwing of a stick, and the use of javelins, is an easy and natural transition. Simple as these acts are, they involve both physical and mental powers capable of all the developments which we see in the most advanced industrial arts. These acts involve the instinctive idea of the constancy of natural causes, and the capacity of thought which gives men the conviction that what has happened under given conditions will under the same conditions always happen again, Did Dr. Whately mean that Man must have been instructed by God how to throw a stone, or to wield a stick, or to hurl a javelin, or to build a hut? And if so, at what point did such lessons in mechanics stop? Is it not evident that the more perfect we suppose the first man to have been, so far as regards at least his powers of thought, of observation, and of reflection, the less needful is it to suppose that the few and simple arts necessary for the sustenance of his life were communicated to him in any other form than that of intuitive powers of perception and discovery?

And here it is important to observe that even if savage races be taken as the type of man's Primeval Condition, the evidence afforded by these races is all in favor of the conclusion that as regards his characteristic mental powers, Man has always been Man, and nothing less. There is quite as much ingenuity and skill in the manufacture of a knife of flint, as in the manufacture of a knife of iron. And the skill displayed by the men who used stone implements is not confined to that which is involved in the selection of mineral substances suitable for the purpose. That skill is also eminently displayed in the use made of those stone implements after they had been fashioned. The smaller implements of bone, or of horn, or of wood, which the stone knives and hatchets were employed to make, are often highly ingenious, and sometimes eminently beautiful. The truth is that high qualities of reasoning and ready faculties of observation are called forth in the inverse ratio of

the acquired knowledge with which they are provided and from which they start. The great ingenuity and resource shown by many of the rudest tribes in their weapons, and the sense of beauty evinced by them in the choice and in the invention of ornamental forms, have hardly been sufficiently appreciated. It is impossible, for example, to read the description given by Sir J. Richardson of the bows and arrows of the Eskimo without being struck by the admirable skill with which their scanty resources, and their limited command of natural material, are turned to the very best account. The throwing-stick of the Australian Savage is a most ingenious application of the principle of the lever. The boomerang must have been discovered, as so many other discoveries are made among ourselves, by pure accident—by some savage throwing a crooked branch, and by his observing its curious and unexpected flight. But every one of these inventions and discoveries involves and exhibits in full operation the peculiar and characteristic gifts of the human intellect. The same gifts and the same powers start in the case of each new generation from a higher vantage-ground of inherited, and therefore of accumulated knowledge; and it is thus that, without any change in their own nature, and even without any increase in their own inherent strength, they attain gradually to higher and more complicated results. And if we are to assume with the supporters of the Savage-theory that Man has himself invented all he now knows, then the very earliest inventions of our race must have been the most wonderful of all, and the richest in the fruits they bore. The men who first discovered the use of fire, and the use of those grasses which we now know under the name of corn, were discoverers compared with whom, as regards the value of their ideas to the world, Faraday and Wheatstone are but the inventors of ingenious toys.

It may possibly be true, as Whately argues, that Man never could have discovered these things without divine instruction. If so, it is fatal to the Savage-theory. But it is equally fatal to that Theory if we assume the opposite position, and suppose that the noblest discoveries ever made by Man were made by him in primeval times.

On these, as well as on other grounds, I have never attached

much importance to Whately's argument. I do not mean to say that the conclusion to which it points may not be true, but it is a conclusion which I look upon as incapable of positive proof.

The question of Man's Primitive Condition must therefore be approached from another side. We can only hope to reach the Unknown by reasoning from the Known; and, starting from this ground, we have the indisputable fact that Man is capable of Degradation. This is a subject which, as it appears to me, Sir J. Lubbock deals with in the most cursory and superficial manner. In fact, as far as it is possible to do so, he avoids it altogether. In his work on "Prehistoric Man" a single page exhausts all he has to say on one of the most prominent facts of History and of Nature, and this page is headed, "No Evidence of Degradation." Yet nothing in the Natural History of Man can be more certain than that both morally, and intellectually, and physically he can, and he often does, sink from a higher to a lower level. This is true of Man both collectively and individually—of men and of societies of men. Some regions of the world are strewn with the monuments of civilizations which have passed away. Rude and barbarous tribes stare with wonder on the remains of Temples, of which they cannot conceive the purpose, and of Cities which are the dens of beasts. It is not necessary to assume, as it has sometimes been assumed, that there is a law of decay affecting communities as certain in its operation as the law which operates on the individual frame. It is enough to note the indisputable fact that men are liable to degradation and decline,—and this even as regards the knowledge and the practice of those industrial arts on which the very existence of large populations may depend. As regards moral character the possibility and the fact of degradation is not less certain. It is a result only too common and familiar, both as regards individuals and societies of men. In truth this kind of decline almost always precedes the other. The higher elements of civilization depend on qualities of the mind. It is by moral and intellectual force that all the triumphs of civilization are achieved. When that force declines, the agencies of degradation establish their ascendency, and the completeness with which they have done their work is one of the standing wonders of the world. No doubt, the an-

cient civilizations which have been so utterly destroyed were in many cases brought to a violent, and as it may be argued, to an accidental end. They were overrun and swept away by the rush of barbarous hordes. But these are accidents which did not happen to civilized nations so long as their civilization was yet undecayed. I am far, however, from denying the powerful influence of external conditions in favoring the development of the peaceful arts, or, on the contrary, in arresting that development, or even in destroying it when it had been long established. Nor am I disposed to keep in the background the effects produced on ancient civilizations by the wars and the great primeval migrations of our race. On the contrary, these are facts which form the next step in the argument I am now maintaining—a step which goes far to connect the possibility of degradation with the known causes which have operated, and in the very nature of things must have operated, in producing it.

For it matters not which of the two theories we adopt in regard to the Origin of the Human Race, whether we suppose it to have proceeded from one or from two, or even from several different centres of creation; it matters not whether we suppose with Sir J. Lubbock that the "first being worthy to be called a Man" was born of some inferior creature, or whether we believe with Whately, that he was truly human in his powers, but required some "elementary instruction to enable his faculties to begin their work." In any case we may safely assume that Man must have begun his course in some one or more of those portions of the earth which are genial in climate, rich in natural fruits, and capable of yielding the most abundant return to the very simplest arts. It is under such conditions that the first establishment of the human race can be most easily understood; nay, it is under such conditions only that it is conceivable at all. And as these are the conditions which would favor the first establishment, and the most rapid increase of Man, so also are these the conditions under which knowledge would most rapidly accumulate, and the earliest possibilities of material civilization would arise.

Now what are the changes of external circumstance which first, in the natural course of things, would bring an adverse influence to bear upon Mankind? Here again we are on firm

ground, because we know one great cause which has been always operating, and we know its natural and inevitable effects. This cause is simply the law of increase. It is the consequence of that law that population is always pressing upon the limits of subsistence. Hence the necessity of migrations, and the force which has propelled successive generations of men farther and farther, in ever-widening circles round the original centre or centres of their birth. Then, as it would always be the weaker tribes who would be driven from the ground which had become overstocked, and as the lands to which they went forth were less and less hospitable in climate and productions, the struggle for life would be always harder. And so it always happens in the natural and necessary course of things, that the races which were driven farthest would be the rudest—the most engrossed in the pursuits of mere animal existence.

And now, does not this key of principle fit into and explain all the facts? Do they not seem in the light of that explanation to take form and order? Is it not true that the lowest and rudest tribes in the population of the globe have been found at the farthest extremities of its great Continents, and in the distant Islands which would be the last refuge of the victims of violence and misfortune? "The New World" is the Continent which presents the most uninterrupted stretch of habitable land from the highest northern to the lowest southern latitude. On the extreme north we have the Eskimo,* or Inuit race, maintaining human life under conditions of extremest hardship, even amid the perpetual ice of the Polar Seas. And what a life it is! Watching at the blow-hole of a seal for many hours, in a temperature of 75° below freezing point, is the constant work of the Inuit hunter.† And when at last his prey is struck, it is his luxury to feast upon the raw blood and blubber. To civilized Man it is hardly possible to conceive a life so wretched, and in many respects so brutal as the life led by this race during the long lasting night of the arctic winter. Not even the most extravagant

* I have adopted the form of this name (usually spelt Esquimaux) which is adopted as the most correct by Sir J. Richardson in his work on the Polar Seas. "Inuit" is the native Eskimo name for their own race.

† Very curious details on Eskimo hunting, feasting, and habits generally are given in Captain C. F. Hall's most interesting work, "Life with the Esquimaux." (Sampson *Low, Son, & Marston.* 1864.)

theorists as regards the plurality of Human Origins, can suppose that there was an Eskimo Adam—that any man was originally created or developed in the icy regions round the Pole. Here then we have a case beyond all question, of races driven by wars and migrations, from the more temperate regions of the globe. So long as they were still in those regions, the ancestors of the Eskimo must have lived in another manner, and must have had wholly different habits. They may have practised such simple agriculture as we know was practised among the most ancient people who have left their remains in the Swiss Lake Dwellings. They may have been nomads living on their flocks and herds. But neither an agricultural nor a pastoral life is possible on the borders of a frozen sea. The rigors of the region they now inhabit have reduced this people to the condition in which we now see them, and whatever arts their fathers knew, suited to more genial climates, have been, and could not fail to be, utterly forgotten. It is a very remarkable fact that this process, by which even the most sterile regions of the globe have been peopled, is a process which appears to be still in operation. Arctic voyagers have long known that there are lands nearer the Pole than those which they have hitherto been able to reach, and it has been even suspected that there exists there a somewhat milder climate and a more open sea. A whaling ship, which in 1867 reached a more northern point than had hitherto been attained, has brought the curious information that a tribe wandering near Cape Chelagskoi had recently driven another tribe before them across the Frozen Sea to a land lying so far north that only its mountain tops could be occasionally seen from the Siberian Headlands.* This farther land has never yet been trodden by civilized Man; and if he ever does reach it, he will thus probably find it occupied by men who may have forgotten how and whence their fathers came.

And now let us pass to the other extremity of the great Continent of America—to Cape Horn, and to the Island off it, which projects its desolate rocks into one of the most inhospitable climates in the world. The inhabitants of Tierra del Fuego are perhaps the most degraded among the races of man-

* See letter in the *Times* of December 30, 1867, from Captain Sherard Osborne.

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kind. How could they be otherwise? "Their country," says Mr. Darwin, "is a broken mass of wild rocks, lofty hills, and useless forests; and these are viewed through mists and endless storms. The habitable land is reduced to the stones of the beach. In search of food they are compelled to wander unceasingly from spot to spot, and so steep is the coast that they can only move about in their wretched canoes." They are habitual cannibals, killing and eating their old women before they kill their dogs, for the sufficient reasons, as explained by themselves—"Doggies catch otters, old women no." Of some of these people who came round the *Beagle* in their canoes, the same author says—"These were the most wretched and miserable creatures I anywhere beheld. They were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbor not far distant, a woman, who was suckling a new-born child, came one day alongside the vessel and remained there out of mere curiosity, whilst the sleet fell and thawed on her naked bosom and on the skin of her naked baby. These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, and their gestures violent. Viewing such men, one can hardly make oneself believe that they are fellow-creatures and inhabitants of the same world." Well might Darwin add, "Whilst beholding these savages one asks, Whence have they come? What could have tempted, or what change compelled, a tribe of men to leave the fine regions of the North, to travel down the Cordillera, or backbone of America, to invent and build canoes which are not used by the tribes of Chili, Peru, and Brazil, and then to enter on one of the most inhospitable countries within the limits of the globe?"* There can be but one explanation. Quarrels and wars between tribe and tribe, induced by the mere increase of numbers and the consequent pressure on the means of subsistence, have been always, ever since Man existed, driving the weaker races farther and farther from the older settlements of mankind. And when the ultimate points of the habitable world are reached, the conditions of existence cause and necessitate

* Darwin's "Naturalist's Voyage," ed. 1852, p. 216.

a savage and degraded life. Darwin gives the true explanation of their condition when he says, "How little can the higher powers of the mind be brought into play! What is there for imagination to picture, for reason to compare, for judgment to decided upon?" The case of the Fuegians is a case in which there can be no doubt whatever of the causes of their degraded condition. On every side of them, and in proportion as we recede from their wretched country, the surrounding tribes are less wretched and better acquainted with the simpler arts. And it is remarkable that in the case of this people we have proof of another point of great interest and importance, viz., this—that even the most degraded savages have all the perfect attributes of humanity, which can be and are developed the moment they are placed under favorable conditions. Captain Fitzroy had in 1803 carried off some of these people to England, where they were taught the habits and the arts of civilized life. Of one of these who was taken back to his own country in the *Beagle*, Mr. Darwin tells us that his "intellect was good," and of another that he had a "nice disposition." We see, therefore, that every fact and circumstance connected with the Fuegians agrees with the supposition that their "utter barbarism" was due entirely to the cruel conditions of their life, and the wretched country into which they had been driven. The Bushmen of South Africa are another case in point. It seems to be clearly ascertained that they belong to the same race as other tribes who are far less degraded, and that they are simply the descendants of outcasts driven to the woods and rocks.* So, again, among the great islands of the Pacific, the natives of Van Diemen's Land were the most utterly degraded of all the Polynesian races.

With these facts staring us in the face, connecting themselves in an obvious order with causes which we know to be all operating in one direction, is it not absurd to argue that the condition of these outcasts of the human family can be assumed as representing the aboriginal condition of Man? Is it not certain that whatever advances towards civilization may have been made among their progenitors, such advances must necessarily have been lost under the conditions to which their children are

* Pritchard's "Natural History of Man," vol. ii.

reduced? Sir J. Lubbock urges, in reply to Whately, that the low condition of Australian savages affords no proof whatever that they could not raise themselves, because the materials of improvement are wanting in that country, which affords no cereals, nor animals capable of useful domestication. But Sir J. Lubbock does not perceive that the same argument which shows how improvement could not possibly be attained, shows also how degradation could not possibly be avoided. If with the few resources of the country it was impossible for savages to rise, it follows that with those same resources it would be impossible for a half-civilized race not to fall. And as in this case again, unless we are to suppose a separate Adam and Eve for Van Diemen's Land, its natives must originally have come from one or other of the great continents where both corn and cattle were to be had, it follows that the low condition of these natives is much more likely to have been the result of degradation than of primeval barbarism. Man as an animal does not belong to the Fauna of Australia. The scientific evidence, therefore, is conclusive that he came to it from other lands. But it is highly improbable that the circumstances of his arrival in the Islands were such as would have enabled him to bring either corn or cattle with him. Whatever knowledge of these things he had before, must necessarily have been lost. The present condition, therefore, of the Australian Savage in respect to these important elements of civilization, affords no presumption whatever that it represents the condition of those from whom he is descended. There is hardly a single fact quoted by Sir J. Lubbock in favor of his own theory, which, when viewed in connection with the same indisputable principles, does not tell against that theory rather than in its favor. The facts indeed which I have hitherto quoted prove only that forgetfulness of arts once practised and of knowledge once possessed must inevitably have arisen among tribes driven into inhospitable regions. But there are other facts also referred to by Sir J. Lubbock himself, which show that there are cases in which we have proof of this process having actually taken place. Thus in regard to the Eskimo, he quotes the case of a tribe in Baffin's Bay who "could not be made to understand what was meant by war, nor had they any warlike weap-

ons." * No wonder, poor people! They had been driven into regions where no stronger race could desire to follow them. But that their fathers had once known what war and violence meant, there is no more conclusive proof than the dwelling-place of their children. So again, Sir J. Lubbock quotes the testimony of Cook in respect to the Tasmanians, that they had no canoes. Yet their ancestors could not have reached the island by walking on the sea. Some of the tribes did not know how fire could be obtained if it were once extinguished.† Again, of the Australians, Sir J. Lubbock reminds us that in a cave on the north-west coast "tolerable figures of sharks, porpoises, turtles, lizards, canoes, and some quadrupeds," etc., were found; and yet that the present natives of the country where they were found were utterly incapable of realizing the most vivid artistic representations, and ascribed the drawings in the cave to diabolical agency.‡ In all these cases we have direct evidences of degradation or of forgetfulness, even since Man first reached the shores of those distant Islands, and we see how it could not fail to be so under the known effect of known cause upon the condition of our race.

And now we can better estimate the value to be set on the arguments which have been founded on the rude implements found in the river drifts and in the caves of northern Europe. I, for one, accept the evidence which Geology affords that these implements are of very ancient date. I accept too the evidence which that science affords, that these implements were in all probability the ice hatchets and rude knives used by tribes which towards the close of the Glacial Age had pushed their way to the farthest limits of the lands which were then habitable. And what follows? The inevitable conclusion is, that it must be about as safe to argue from those implements as to the condition of Man at that time in the countries of his Primeval Home, as it would be in our own day to argue from the habits and arts of the Eskimo as to the state of civilization in London or in Paris.

For here I must observe that Archæologists are using lan-

* "Prehistoric Times," p. 410.
† Ibid. pp. 354-55.
‡ Ibid. p. 348.

guage on this subject which, if not positively erroneous, requires, at least, more rigorous definitions and limitations of meaning than they are disposed to attend to. They talk of an Old Stone Age (Palæolithic), and of a Newer Stone Age (Neolithic), and of a Bronze Age, and of an Iron Age. Now, there is no proof whatever that such Ages ever existed in the world. It may be true, and it probably is true, that all nations in the progress of the Arts have passed through the stages of using stone for implements before they were acquainted with the use of metals. But knowledge of the metals must have arisen at very different epochs in different regions of the earth. In South Africa flint implements have lately been discovered in abundance, but over a large portion of that vast continent the knowledge and the use of iron seems to have been of very ancient date ; and I am informed by Sir Samuel Baker that iron ore is so common in Africa, and of a kind so easily reducible by heat, that its use might well be discovered by the rudest tribes. As a matter of fact, they are now all excellent workers in iron. Then again, it is to be remembered that there are some countries in the world where stone is as rare and difficult to get as metals. In them the use of stone implements may imply even an extended commerce. The great alluvial plains of Mesopotamia are a case in point. Accordingly, we know from the remains of the First Chaldæan Monarchy that a very high civilization in the arts of agriculture and of commerce co-existed with the use of stone implements of a very rude character.* This fact proves that rude stone implements are not necessarily any indication whatever of a really barbarous condition. Assuming then that the use of stone has in all cases preceded the use of metals, it is quite certain that the same Age which was an Age of Stone in one part of the world was an Age of Metal in another. As regards the Eskimo and the South-Sea Islanders we are now, or were very recently, living in a Stone Age. And so it has been in all past times of which any record remains. The whole argument therefore which has been founded on flint implements, is an argument liable to these two fundamental objections, first that flint implements are a very uncertain index of civilization, even among the tribes who used them ; and secondly, that they

*Rawlinson's "Five Great Monarchies," vol. i. pp. 119, 120.

are no index at all of the state of civilization among other tribes who lived at the same time in other portions of the globe. The finding of flint implements, for example, however rude, in England, or in Denmark, or in France, affords no evidence whatever of the condition of the Industrial Arts in the same age upon the banks of the Euphrates or the Nile.

There is one argument of Sir J. Lubbock in favor of the Savage-theory, which I observe with as much astonishment as that which he expresses in reference to some of the arguments of Whately. Sir J. Lubbock says that some savages have been found who have no religion at all. Such, he argues, was probably the condition of Primeval Man, because he "feels it difficult to believe that any people which once possessed a religion would ever entirely lose it." Surely, if there is one fact more certain than another in respect to the nature of Man, it is that he is capable of losing religious knowledge, of ceasing to believe in religious truth, and of falling away from religious duty. If by "religion" is meant the existence merely of some impressions of powers invisible and "supernatural"—even this, we know, cannot only be lost, but be scornfully disavowed by men who are highly civilized. Nor does Sir J. Lubbock's comment upon this subject gain by the further explanation which he gives. He says that "Religion appeals so strongly to the hopes and fears of men, it takes so deep a hold on most minds, it is so great a consolation in times of sorrow and sickness, that I can hardly think any nation would ever abandon it altogether." There are two obvious replies to such reasoning: the first is, that many false religions do not answer to this description so far as regards their self-recommending and consoling power; the second is, that neither does true religion answer this description to those who are corrupt and vicious. Belief in a God who is "of purer eyes than to behold iniquity" is a belief which bad men may not have liked to cherish. As regards the first of these two replies, Sir J. Lubbock himself bears emphatic testimony to its force. In his work on "Prehistoric Man," speaking of the savage, he says,* "Thus his life is one prolonged scene of selfishness and fear; even in his religion, if he has any, *he creates for himself a new source of terror*, and peoples *the world with invisible*

* P. 484.

enemies." Yes, and this is mildly stated. The most cruel and savage customs in the world are the direct effect of its "religions." And if men could drop religions when they would, or if they could even form the wish to get rid of those which sit like a nightmare on their life, there would be many more nations without a "religion" than there are found to be. But religions can neither be put on nor cast off like garments, according to their utility, or according to their beauty, or according to their power of comforting. Among the causes which have determined their form and character in different nations we must reckon the moral corruption of human nature. I am not speaking of this corruption in a dogmatic and theological sense; I speak of it as an unquestionable fact, whatever be the history of its origin. By the corruption of human nature, I mean the undeniable fact that Man has a constant tendency to abuse his powers, to do what according even to his own standard of right or wrong he knows he ought not to do; to be unjust and cruel towards others, and to fall into horrible and degrading superstitions. Human corruption in this sense is as much a fact in the natural history of Man as that he is a Biped without feathers. It is entirely independent of any belief, or any theory as to Man's original condition. Sir J. Lubbock's argument implies that the tribes, if such there be, (which, by the way, is extremely doubtful) who are not known to have any ideas at all in respect to spiritual beings or to another world, are in a lower condition than tribes which have a "religion," however cruel and horrible its rites may be. According to this theory, even devil-worship would be a step in ascent towards "civilization" from the "utter barbarism" of Primeval Man. But this is a theory as contrary to reason as it is contrary to all the evidence we have on the history of Man. The farther we go back in that history the more clear become the traces of some pure traditions, and the rays of some primeval light. Such evidence as history and philosophy and criticism afford on the course of religious knowledge is not in favor of the doctrine of a gradual rise, but, on the contrary, of continuous corruption and decline. "If there is one thing," says Professor Max Müller, "which a comparative study of religions places in the clearest light, it is the inevitable decay to which every *religion* is exposed . . . . Whenever we can trace back a

religion to its first beginnings, we find it free from many blemishes that affected it in its later stages." * One of the most ancient religions of the world is represented in its earlier form in the Sanskirt Vedas, and the contrast between its doctrines and those of existing Hindooism is but a sample of the working of a great law which can be traced in every region of the world. This is no case confined to some little corner of the earth, or to some short period of time, or to some partial and accidental cause. It is the case of a religion which in all its branches embraces uncounted millions of the human race, and the history of which extends over more than 3000 years. Nor is the sense in which corruption and decay are predicated of this religion at all vague or indefinite. It has become lower, ruder, more corrupt,—in its conceptions of the Divine Nature,—in its notions of acceptable worship, and in the social institutions which are connected with Belief.

The truth is, that Man's capacities of degradation stand in close relation, and are proportionate, to his capacities of improvement. What faculty of the human mind lies nearer to the very centre of its highest life than the faculty of Imagination? Without it we could not interpret Nature, or form any conception of its laws, or feel their harmony, or understand their use. Without it we could not see the Abstract or read the Future. Without it we should be without motive to resist Impulse, or to maintain Conviction, or to rise to Duty. We could form no idea whatever of Religion. It would not be possible to desire the Unknown or to hope for the Unseen. And yet Pascal was not wrong when he placed this same faculty of Imagination at the very head of the "Deceitful Powers." For it is, in truth, one of the most effective causes and instruments of Degradation. It is its function to give form and expression to all those vague emotions which arise inevitably out of contact between the mind that is in Man and the mind that is in Nature. These emotions are literally what the Poet calls them—"the blank misgivings of a creature moving about in worlds not realized." But without Knowledge given or acquired, to guide the elements in Imagination which are purely intellectual, and without virtue to control the elements

* "Chips from a German Workshop," vol. i., pref., xxiii.

which are chiefly moral, this "Superb Power," as Pascal also most justly calls it, does terrible work indeed. It is the mother and the nurse of all the horrible inventions of Idolatry. Through its operation have arisen, from time to time, all the diabolical rites which have degraded, and do still degrade, so many tribes of men far below the level of the brutes. But irrational as the superstitions of heathen nations may appear to be, and even inconceivable in a Being who is capable of reason, it should never be forgotten that this is true only of the last developments of Idolatry, and is by no means true of its first beginnings. On the contrary, these are among the most natural of all spiritual temptations, and perhaps the most difficult to resist. The first of the Commandments is of all others the most difficult to obey: "Thou shalt have no other Gods before Me." The dependence of the human mind on outward symbols, and then its tendency to identify the symbols with the conceptions they represent—these are the roots of all Idolatry. The course of thought, in our own day, even among highly civilized and enlightened men, may well remind us how easy and how natural it is to lapse into systems of belief, which in their fundamental character are essentially Creature-worship. The fact is, that so far from there being any difficulty in understanding how spiritual truth, once known, could be ever lost, all observation and experience prove that it is the most difficult of all things to maintain with even tolerable purity any high standard of spiritual faith. A thousand tendencies from within, and from without, are perpetually at work to undermine, or to transform it. And then the awful correlations of Human Thought render it not only probable but inevitable that the first departures from the knowledge and the love of Truth must end in wider and wider divergence from it. The infinite subtlety and ingenuity of Imagination will, when it is ignorant and corrupt, amply account for the origin and growth of even the most degraded superstitions. This is a subject too extensive to be pursued here; but it could be shown that even among the South Sea Islanders, and other tribes who have been driven farthest from the original settlements of Man, there were many religious customs of which those who prac-

tised them did not know the origin or the meaning, and which clearly indicated their derivation from an older, a more intelligible, but a forgotten faith.

This is also eminently true of the religious rites and practices of some of the Hill tribes of India. A most curious and interesting account of human sacrifices by the Khonds, one of the Hill Tribes of Orissa, has been published by my friend, Major-General John Campbell, who has been mainly instrumental, under the Government of India, in the abolition of this horrid rite. The absolute rule that the victims must be procured by purchase, stands in unmistakable relation to the only intelligible principle in the very idea of sacrifice, namely, the principle of self-sacrifice.

Here for the present I must leave the subject. My chief object has been to show how little really depends on some of the arguments which have been put forth by both sides in this controversy, and to indicate what seems to me to be the true bearing of the facts which as yet have been clearly ascertained. I set little value on the argument of Whately, that as regards the mechanical arts Man can never have risen "unaided." The aid which Man had from his Creator may possibly have been nothing more than the aid of a Body and of a Mind, so marvellously endowed, that Thought was an instinct, and Contrivance was at once a necessity and a delight. But I set still less value on the arguments of Sir J. Lubbock, that Primeval Man must have been born in a state of "utter barbarism," on the ground that this is the actual condition of the outcasts of our race, or that industrial knowledge has advanced from small beginnings, or that there are traces of rude customs among many nations now highly civilized. None of these arguments afford any proof whatever, or even any reasonable presumption, in favor of the conclusion which they are employed to support: first, because along with a complete ignorance of the Arts it is quite possible that there may have been a higher knowledge of God, and a closer communion with Him; secondly, because many cases of existing barbarism can be distinctly traced to adverse external circumstances, and because it is at least possible that all real barbarism has had its origin

in like conditions; thirdly, because the known character of Man and the indisputable facts of history prove that he has within him at all times the elements of corruption—that even in his most civilized condition, he is capable of degradation, that his Knowledge may decay, and that his Religion may be lost.

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KE OF ARGYLL DEAD, AGED SEVENTY-SEVEN.

ON, April 24.—George Douglas
ll, Duke of Argyll, died this

ghth Duke of Argyll, the Mac-
More, head of the great family
hell, was born April 30, 1823.
numerable titles—he was a
uis, an earl, a viscount, a
ther-in-law of one of the
isters. He married three
m 1851, a very charming
ot enough to be his grand-
the Hon. Ida Erskine Mc-
man of the Redchamber to
He has had eleven children,

owned an estate of [illegible] acres.

Forty-nine years ago the Duke entered Lord Aberdeen's Cabinet as Lord Privy Seal, and he held the same office under Lord Palmerston and Mr. Gladstone. He had been Postmaster-General two or three times and for six years he was Secretary of State for India. Indeed, it seemed impossible for a Liberal Ministry to go without him, and when the split in the Liberal party on the Home-Rule question occurred the greatest blow that Mr. Gladstone suffered, next to the secession of John Bright, was that of the Duke of Argyll.

He was a Presbyterian by [illegible]

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